# Engines and Templates: Correcting Effects Confused as Causes



Adapted from personal correspondence

## Foreword:

Though deliberately informal, this is a very difficult paper, both to write and to read. We are struggling to explain and correct one of the great, pervasive flaws in physics foundations, which is the confusion of cause and effect, both in mechanics and particularly in electrodynamics. The reader is likely to find the going very rough; indeed, one will need to continually reflect very deeply on the "operational observation situation applying or not applying to what is being discussed at this moment".

I apologize for the density of the subject matter and that in a single sentence it is necessary to switch between two opposite operational situations. The "implicitly assumed" operational situation has been largely hidden and misunderstood for more than a century, and is still vastly confused in the extant physics literature. We attempt to point out how these assumptions (often quite unconsciously) were included by the older pioneering physicists. Some foundations quotations are added to show the problem and that it has not been solved.

So we advise patience if the reader is truly interested in this important foundations issue and a possible resolution. We urge the reader to heed Einstein's excellent advice, which he stated so beautifully as:

> "...the scientist makes use of a whole arsenal of concepts which he imbibed practically with his mother's milk; and seldom if ever is he aware of the eternally problematic character of his concepts. He uses this conceptual material, or, speaking more exactly, these conceptual tools of thought, as something obviously, immutably given; something having an objective value of truth which is hardly even, and in any case not seriously, to be doubted. ...in the interests of science it is necessary over and over again to engage in the critique of these fundamental concepts, in order that we may not unconsciously be ruled by them." [Albert Einstein, "Foreword," in Max Jammer, Concepts of Space: The History of Theories of Space in Physics, Harvard University Press, Cambridge, Massachusetts, 1969, p. viii.]

Lindsay and Margenau, in their noted Foundations of Physics, make the same point:

> "[Hypotheses made without realizing that they are being made] …are what Poincaré has called "unconscious" or "natural" hypotheses—a type which one hardly ever challenges, for it seems too unlikely that we could make progress without them. Nevertheless it should be the endeavor of the physicist always to drag them out into the light of day, so

that it may be perfectly clear what we are actually doing."

Physicists have indeed struggled with the "confusion of cause and effect" but usually under different terminology—often speaking of "dual" use or of a "duality" theory. E.g., Sen states it as particle and field (but note that field is usually intended to imply cause, and particle is usually intended to imply effect). Quoting Sen:

> "…it seems to be a strange characteristic of the human mind that it is forced to describe the physical properties of matter either as fields or particles. The whole history of physics appears as a struggle to either clarify or escape from this either or dichotomy."
>
> "…a theory [is] dualistic if it supposes that the source of the field, i.e., the particles with their characteristic masses and charge, etc., form a separate entity apart from the field which they generate." [D. K. Sen, Fields and/or Particles, Academic Press, London and New York, 1968, p. viii.].

Even in recognizing the duality of a theory, however, physicists often have not clearly recognized that they confuse effect as cause in their use of the field concept itself. So they have not resolved the issue, even with the "duality" principle which was just an agreement to quit fighting and use either the particle view or the wave view, as one wished, if it worked. It did not address or solve the confusion of wave and particle, and of cause and effect.

The field concept itself is perhaps the most primary example of dual use of a concept for two precisely contradictory things. The concept of a force—which is an effect and never a cause, but is used nearly universally as a cause—is also a fundamental part of the confusion. Force is an observable, and all observables are effects of the observation process a priori. The d/dt operation of the observation process was also not properly taken into account.

Insofar as questioning the "dual field concept" is concerned, the problem certainly has been long debated, but not resolved. As we mentioned, there is fundamental duality involved even in the notion of force itself. E.g., quoting Feynman:

> "…in dealing with force the tacit assumption is always made that the force is equal to zero unless some physical body is present… One of the most important characteristics of force is that it has a material origin, and this is not just a definition. … If you insist upon a precise definition of force, you will never get it!" [Richard P. Feynman, Robert B. Leighton, and Matthew Sands, Lectures on Physics, Addison-Wesley, Reading, MA, Vol. 1, 1964, p. 12-2.]

Feynman and Wheeler also pointed out that the force field assumed in classical EM theory only existed where charged mass was interacting. Hence it could not exist in empty space where no observable charged mass exists. They did not include mass as a component of force, but stopped short of it. They attempted to correct electrodynamics by advancing an EM model based on absorber theory. However, the fields used in their theory still maintained their

unacceptable dichotomy, so the theory—though quite valiant—did not succeed.

In various places Feynman specifically pointed out that the field as conceived could not and did not exist in mass-free space, but only the potential for the field existed there, should there be some charged mass there to interact with. E.g., in Feynman, Leighton, and Sands, ibid., p. 1-3, Feynman states:

> "We may think of E(x, y, z, t) and B(x, y, z, t) as giving the forces that would be experienced at the time t by a charge located at (x, y, z), with the condition that placing the charge there did not disturb the positions or motion of all the other charges responsible for the fields."

This is actually a realization that the field is an effect (after interaction) rather than the cause (what exists before the interaction occurs). It clearly reveals the dichotomy of using the word "field" as both the entity existing in spacetime before the interaction and thus the cause, and as the entity (the "effect field" existing after the interaction of that "causal field" with charged mass. That is very much like saying the field—an effect—is also its own cause. Also note that Feynman still uses the charges as the "cause" of the fields. Yet since charged mass is an observable, it is an effect. Here again we meet the fact that an "effect" is considered to be a cause. This problem of the "association of the field with its source" has long been recognized as a formidable problem. Again quoting Sen ibid., p. viii:

> "The connection between the field and its source has always been and still is the most difficult problem in classical and quantum electrodynamics."

We solved this long-vexing problem in our "Giant Negentropy of the Common Dipole" paper, which is carried on this website. It is solved by reinterpreting and extending Whittaker's 1903 decomposition of the scalar potential (as between the ends of a dipole) and by treating the charge with its clustered virtual charges of opposite sign as a set of composite dipoles.

Most electrodynamicists have taken a pragmatic approach to the "duality of the field concept" and simply "bypassed" that tough problem. One can be very sympathetic to this view! After all, eventually one must use the electrodynamics model to do practical things and get practical results, i.e., effects. As an example, one of the finest electrodynamics books for two decades is J. D. Jackson, Classical Electrodynamics, 2nd edition, Wiley, New York, 1975. Jackson avoids confronting the field dichotomy in this fashion:

> "...the thing that eventually gets measured is a force..." "At the moment, the electric field can be defined as the force per unit charge acting at a given point. [p. 28].
>
> "Most classical electrodynamicists continue to adhere to the notion that the EM force field exists as such in the vacuum, but do admit that physically measurable quantities such as force somehow involve the product of charge and field." [p. 249].

These statements recognize that the "field as it exists in charge-free spacetime" is not a force

field, but does not reconcile that position with the definition of the (e.g., electric) field itself as $E \equiv F/q$. It can be seen that mass is a component of the field-as-defined because mass is a component of force by $F \equiv d/dt(mv)$. But "adhering to the notion that the EM force field exists as such in the vacuum" is where the problem lies. That is saying that the "effects" field after observation is precisely the same thing prior to observation. Since observation is a d/dt operator, actually the cause field has to differ in dimensionality by the unit of time.

For any reader to begin, an excellent treatise on physics foundations is Robert Bruce Lindsay and Henry Margenau, Foundations of Physics, Dover, New York, 1963, previously quoted. Lindsay and Margenau point out the difficulties in the causality concept itself, and on p. 18-19 they state:

> "The proper definition of the term cause has been a controversial subject among philosophers for a long time…" …All that the laws state is a relation among symbols which represent well-defined operations in the laboratory, and no notion of precedence or antecedence, or dynamic enforcement, is involved in them. … [Difficulties with assumed certainty] …should by no means be interpreted as denying the importance of a principle of causality in physics. …It is in itself a hypothesis concerning the behavior of physical systems."

As this small cross-section of the foundations literature shows, the best physicists themselves have great difficulty in clearly separating cause and effect, specifically as they involve more terms. In the same sentence, one often finds the same entity stated in the front as a cause, yet in the back as an effect! We merely have wished to show the extreme difficulty of properly sorting out and clarifying one's own use of the terms "cause" and "effect", as well as one's unconscious use of cause and effect richly intermingled and erroneously exchanged in one's own daily conversation and writing. In Einstein's words, we imbibed this confusion with our mother's milk!

This informal paper is certainly not intended to be the "definitive statement" on the matter! Instead, it is intended to merely point the way to a deeper consideration of the field, and to its present erratic and erroneous usage in a dualistic manner, and to how to solve the problem.

We use a simple "discriminating" notion: We use "observation" as a process occurring in ongoing spacetime, involving a cause acting on (interacting with) a previously observed effect, generating a change (effect) in that previously observed effect. Whenever one says the word "effect," one assumes (usually unconsciously) a continual iteration of observation. In short, we assume the continual iterative production of effects, each rigorously static and frozen, much like the frames of a movie film. The "progress of change" is added by perception, by our mind's normal operation which is innate. On the other hand, we point out the assumption, in that notion of continual iterative observations, of "time-forward" motion through time. In a time-reversed situation, the exact opposite happens, and we may think of the observation interaction as reversed in direction in the iteration of the d/dt operator. In short, we go back

along the movie film, so to speak, rather than forward. Thus perceptually we would "see" (not observe!) the steady production of what had previously been the causal set, but backwards, from what had previously been the effects set (but backwards). We may regard this as the production of reversed time-forward "causes" from reversed time-forward "effects". Only the reversed time-forward "effects" constitute observables; the stream of "produced causes" is not observable. Nonetheless, that stream can be calculated, and in fact does appear in that manner in general relativity.

One must be very careful when thinking "cause and effect" in reversed time. It is not that the "cause becomes the effect and the effect becomes the cause," because cause and effect have been named (standardized) in forward time. So what we actually perceive but cannot observe is the causal interaction running backwards. So we perceive the usual ordering of effect and cause reversed—but observation only sees that reversed ordering of effects. Since the symmetry inherent in Newton's third law implies both time forward to produce the action observed, and time-reversed to produce the equal reaction observed, it would seem that at the most fundamental level there always exists a two-way symmetry between the ordering of effects, and thus the so-called independence of physics to the direction of time (i.e., the principal equations operate "backwards" as well as "forward").

In fact, general relativity does capture this very kind of symmetry between the ordering of the continually observed effects, since a change in the curvature of spacetime in turn produces a change in the mass-energy with which it interacts, and the change in the mass-energy correspondingly produces a change in the curvature of spacetime. We have also constructed our approach largely consistent with O(3) electrodynamics, which is an important subset of Sachs' unified field theory. Hence time (and spacetime) do play primary roles in the approach.

We also encourage bright young doctoral candidates and post-docs to consider giving the entire "duality of fundamental concepts which use effect as cause" problem a very rigorous and extended treatment. Such is sorely needed in physics, because frankly the confusion of cause and effect has been a wholesale epidemic for nearly four centuries. But sadly it is still little noticed or emphasized, even today.

We are attempting in this informal paper to "point the way" to possibly how this long-vexing confusion can be resolved. As the reader will appreciate as he or she goes through this paper, the problem is complex. It will require enormous effort and time to ever get physics (and scientists in general) scrubbed of this ubiquitous problem we have all inherited since our birth.

This reflection is related to the template and engine concepts, and it is related to other years of reflection. The present stream of thoughts was stimulated by nanotechnology's more mechanical use of the concept of template.

Abstract:

As modified and extended from a response to a scientist working in nanotechnology, we discuss the concepts of template (ordered form of multiple deterministic spacetime curvatures and their impressed dynamics) and engine (the actual curvature set itself and its ongoing dynamics). This is an extension to the more mechanical template concept presently applied in nanotechnology and in forthcoming nanobots. In the discussion we explain how longitudinal EM wave technology is at the very heart of the new template and engine concepts, in unified field theory in general and in the O(3) electrodynamics approach in particular. We discuss Becker's work and Prioré's work as having unwittingly applied early engine technology and demonstrated its effectiveness. We explain how the template of a cellular disease or disorder can be utilized to generate a specific anti-engine to reverse the condition and move the cell back to a previous healthy condition. In short, we advance a universal cure mechanism for all cellular diseases and disorders, at least in theory, once the technology sufficiently develops.

We also point out the urgent need to develop engine technology to treat and cure mass casualties from the coming terrorist attacks on our population centers. Without such technology, triage—no treatment at all for most of the casualties—will of necessity be used and millions of Americans will be deliberately left to die without any real treatment given or even attempted.

The flavor of the original communication to a nanotechnology specialist is maintained, but changes have been made to add headings for clarity, further explain the major points, correct some typographical errors, etc. Selected pertinent references have also been added at the end. As time permits, we will furnish color illustrations for some of the main points, and these will be added to this article.

Introduction

(To Correspondent). Just found your nice work on nanotechnology, and I want to express my appreciation for your efforts on this important subject, making the information widely available. I was also struck by your insight and use of the template concept, and wish to comment on where the "templating" concept and the associated "engine" concept lead.

First, if we can control the electrodynamics at very tiny positions, we obviously can control the mechanical forces (or most of them), much of the chemistry, etc. But we also can control much more than that, if we examine higher symmetry electrodynamics rather than the standard U(1) model. The U(1) EM model is seriously limited, even flawed in many respects.

Our work with the Alpha Foundation's Institute for Advanced Study (AIAS) has for some time been laboring on a more effective, dramatically extended electrodynamics known as O(3) gauge symmetry electrodynamics, or just O(3) for short. This electrodynamics has been spearheaded by Dr. Myron Evans, who has over 600 papers in the refereed literature, and is the

editor of several prestigious scientific volume series.

Extended Electrodynamics Engineers General Relativity

Briefly, a remarkable thing has happened to O(3) electrodynamics, and it bears directly upon the notion of templating that is being used for molecular templating in nanotechnology, but is just more advanced. O(3) has been shown by Dr. Evans et al. to be an important subset of Dr. Mendel Sachs' unified field theory, which covers everything from the smallest state (e.g., gluons) to the entire universe in a comprehensive and unitary manner. The union of Evans' O (3) electrodynamics and Sach's extended general relativity unified field theory offers for the first time a breathtaking vision of being able to directly engineer spacetime curvatures in exact patterns and sets—the ultimate templating—by novel electrodynamic means.

In general relativity there is a two-way interaction between spacetime curvature and mass energy, including the dynamics. As Wheeler states it, mass-energy works on spacetime to curve it, and curvature of spacetime works on mass-energy to change it. This is true at any level, including in the interior of the nucleons of the atomic nuclei.

Indeed, a similar vision in more primitive form was the early inspiration for modern science. E.g., Francis Bacon stated it this way:

> "The end of our foundation is the knowledge of causes, and the secret motion of things, and the enlarging of the bounds of the Human Empire, to the effecting of all things possible." [Francis Bacon, 1561-1626.]

Einstein also commented about unified field theory as follows:

> "It would of course be a great step forward if we succeeded in combining the gravitational field and the electromagnetic field into a single structure. Only so could the era in theoretical physics inaugurated by Faraday and Clerk Maxwell be brought to a satisfactory close."

That goal appears to now be in our grasp, using the Sachs' unified field theory and the O(3) electrodynamics as a special subset of Sachs' theory which makes it engineerable by electromagnetic means.

The approach is testable—more on that later, in discussing Becker's work and the Prioré work. It appears that one can directly produce exact templates of spacetime curvatures and their dynamics. Once the technology develops, these spacetime curvatures can be produced to act in ensemble on mass and its dynamics in any fashion—at any level, rising from local spacetime within the mass itself. I have previously been referring to a specific set of spacetime curvatures and their dynamics as an engine. I refer to the precise dynamic form for the engine as a template. The simplest engine is the spacetime curvature causing a single force, and its simple form is the simplest template.

Hence, just as you have foreseen at a mechanical level in nanotechnology, for every cellular condition there is a template (exact form, to include the dynamics). There is not only a template of the "effects" (conditions of the cell, continuous observation assumed), but there is also an ongoing specific resident engine involved in dynamic interaction with each cell and every tiniest part of it, right down to the nucleons inside the atomic nuclei. What Western science has missed is that not only is there a mechanical template and dynamics for the functioning mass system itself as continually observed at all levels, but there is also a precisely correlated engine and template of dynamic spacetime curvatures that are the unobserved causes in the local spacetime in which the mass system (continual observation assumed!) is embedded. This spacetime energy and the 3-spatial mass-energy are in constant interaction with each other.

The Notion of Space

Space in its most general sense refers to our characteristic of perceiving things apart. What we call "geometry" is very useful in physics for the study of space and apartness. Geometry is primarily the mathematical set of constructs (axioms, theorems, mathematical functions, etc.) we use to arrange the relationships (characterize the "apartness") of our perceived separated things. As Lindsay and Margenau point out in their Foundations of Physics,, p. 71, there are in fact an infinite number of geometries! There is even a valid geometry in which a straight line may be perpendicular to itself, as shown by Poincaré in his Foundations of Science, Science Press, New York, 1913, p. 63.

We point out that when observation has occurred, the observed entity is already in the "separation" or "separated" state. It is therefore 3-spatial by the very definition of space. But that single observation is a frozen 3-space snapshot. It itself does not change, and never happens again; it is already in the past when it has occurred. This casts strong question upon the notion of an observable (such as a mass) propagating through space, and changing its position in apartness (in space). When it was observed, it has an absolutely fixed position in space. Hence to observe it in a different position is a different observation. That is the importance of realizing that an observable does not persist a priori, physically, but that an iterative series of observations of the causal interactions continuing to occurring with that single thing in that single observation, gives a series of observations which has four cases: (1) there is no distinguishable "change" between one observation and another or in any separate observation of the various features (parts) of the greater observable. Hence that observable is "perceived to persist in the same form" in the mind's perceptual iterative recall from memory. (2) there is a distinguishable change in the object's features, but not in its spatial position. Hence, e.g., we might see a flower withering in its vase, in the same position, but "aging". We perceive in our recall comparisons that it changes in place. (3) We distinguish in our iterative recall no change in the internal features of the object, but we see its spatial position changing in the iterative stream of perceptual recall comparisons. So we perceive motion; e.g., a pitched ball moving through the air. (4) In our perceptual recall and comparison stream, we see its

spatial position changing and also its internal features changing. Therefore we see, e.g., an aircraft struck by a missile lose its wind, falter, start to fall, catch fire and flame up, then explode.

We also "file" in our experiential memories a huge catalog of such observations and perceptual recall and comparison chains. Hence we are able to "anticipate" a crouching tiger's leap, by recall from our catalog.

On the other hand, we also find a need for using our geometries to model changes detected in iterative observations. Hence we must introduce another mode of abstract thinking of our sensory impressions: we must have a way of ordering our observations. Actually the conscious mind is a serial process but very rapid. So we have temporary registers (short term memory) and intermediate registers (medium term memory) and also very long or permanent registers (long term memory). Just as any modern computer, the conscious mind is adept at recalling and comparing the contents of these registers. This ability and functioning is unconscious, inborn, and innate. It is totally automatic and usually we do not even have to be aware of doing such rapid processes.

When we take into account these iterative processing functions of the conscious mind, the ordering becomes an extraordinary capability of the human mind and perception.

The Notion of Time in Physics

Time is a term we use in physics to express the results and operations of a characteristic mode of abstract thinking which orders the results of our sensory impressions. It utilizes the memory, recall, and comparison functions we mentioned. Because of the ubiquitous photon interaction with each and every part of the universe, all parts of it are continually interacted "as if observed" and then again and again causally. So "change" is the incessant characteristic of the universe and all parts of it.

Fundamentally, time is the consideration of "everything at once"—all sensory processes and all the "apartness" spatial orderings—at any "moment" (that all-at-onceness). But because of the physical changes in all these photon-interacted "things apart", then "everything at once" is seen to change because the various parts are changing (remember, we are in extraordinary rapid recall and comparison operations mentally, and can "switch" from all to one to any group of compared perceptions instantly. So we can think of the universe as totally separate things, as totally separate changing things, as an instantly "entire one-thing", as a totally changing instant "one-thing", etc. without effort. The sense of "all things as one-thing changing" gives us the sense of physical time passing at a rate, for everything. The sense of "a single thing changing" because of the iterative comparisons of its previous observations, gives us the sense of "that thing changing in time". This is how we see "an observed thing persisting", even though no observation persists. We are integrating the continual iterative observations by recall and comparison from memory.

Regular changes (such as the earth orbiting the sun, in a "year"), in the ensemble of total changes, give us the sense of "the regular flow of time", time intervals such as a year, etc. In short, it enables clocks and the "measurement" of time by comparison with some "standard time interval" (time required for some standard process to make one or a certain number of repetitions).

Time is not "observable", even in principle, because it is a sense of ordering achieved by the human mind, as a synthesis of description of two very important characteristics of our sensory impressions: (1) the sense of "integrating everything into a one-thing", and (2) observing the differences in the recall comparisons of previous observations with the present observation.

There is also the question of whether the "flow of time" is continuous or discrete. Here we point out that it is both (we violate Aristotelian logic, but that is okay; Aristotelian logic is incomplete. See my extension and completion of it elsewhere on this website). The model we advance is a model containing a host of "discrete" changes along a time line, but with all sorts of other "discrete changes" simultaneously bridging the "gap" across any two discrete changes in a single line.

Even so, we have not really defined time, and neither has anyone else. It may be that we have to remain satisfied with the fact that the concept of time rises from our attempts to understand processes which our own mind does innately, automatically, and unconsciously. We are born to do it that way! To deal with the time concept, we have had to use the process itself, whatever it may really be. After all, all our words are ultimately drawn from primitive observation, and with the "time" concept we are attempting to define the unobservable as if observed. That cannot be done in Aristotelian logic, but can be done in 5-law logic where opposites can be identical (as perceived, because of the extra mental recall and comparison functions and the mind's ability to change these functions instantly and "during the process" of comparison. So we have had to define the thing in terms of itself. This difficulty with time is the essence of the philosophers' great frustration, when they were unable to resolve their fundamental problems (nature of time, nature of being, nature of change, nature of mind, etc.). Their term "thing-in-itself" was actually a desperate term used to imply, "Oh, twiddle! You know, the thing as whatever it really is anyway!" With that said, we must leave the notion of time without having really "defined" it.

We will highly recommend the reading of Morris Kline, Mathematics: The Loss of Certainty, for all those readers so enamored of mathematics that they believe it captures "truth" and "absolute truth". It doesn't. That has been proven somewhat obscurely by the mathematicians themselves. We also urge the reader to read something such as Thomas J. Jech, The Axiom of Choice, American Elsevier, New York, 1973. The axiom of choice is an advanced mathematical theorem that is further used in the proofs of many other advanced mathematical theorems. A great deal of advanced mathematics thus depends upon the axiom of choice. Yet its employment demonstrates that "absurd" results must be expected. E.g., p. 3-6 contains the

proof that it is possible to cut a ball into a finite number of pieces and rearrange them to get two balls of the same size as the original one.

So we will just accept the results of our reflection upon time, and accept that we have not been able to completely define it but only characterize the type of perceptual mind operations involved, and proceed.

Working in a General-Relativity-Based Unified Field Theory

The beauty of working in a general relativity-like format is that we can work in the time domain [for energy and curvature, electromagnetically since we are in O(3)] as well as in the 3-space domain. So not only can we work on mass-as-it-is, but mass-as-it-moves or has moved in the time stream. The entire notion of external force acting upon a separate mass is quite incorrect; a priori mass is a component of force by its definition: Force $F \equiv d/dt(mv)$.

There is also a hidden assumption in the notion of an "observable persisting". That is, "observable persisting" is a non sequitur. What is unconsciously assumed in the statement that "an observable persists" is that the observation process is being continually and consecutively applied to give a stream of d/dt outputs (effects). If we "observe no changes", then we perceive in our minds (by recall and comparison at very great speed, automatically and innately) the same observable (effect) with no change in our mental comparison. An observable is a frozen snapshot as produced, and that frozen snapshot does not and cannot exist at the next moment! Instead, another snapshot exists at the next moment—again, like the individual frames in a movie film.

In short, we never observe even the present, but only "the most recent past". The observation process is finished when we have an "observation", and that was the output of that process (which is usually referred to as the "collapse of the wave function" in quantum mechanics. No wave "exists" as such unless it exists in 4-space. But the d/dt operation of observation is in fact the destruction of the time-domain momentarily. That destroys the time-aspect of the wave, leaving a frozen snapshot (an observable). As we have stated elsewhere, the ubiquitous absorption of photons—both of quantum and subquantum size—by a mass is what adds a "time" dimension to the frozen 3-space entity mass. The photon is comprised of a "piece of energy welded to a piece of time, with no seam in the middle". In short, the photon is comprised of $(\Delta E)(\Delta t)$. Upon absorption by a mass, the increment of energy $\Delta E$, divided by $c^2$, gives a tiny bit of extra mass $\Delta m$ that is added to the mass m, to give $(m+\Delta m)\Delta t$. Note that we did not and cannot just ignore that $\Delta t$ component of the photon in photon absorption. Indeed, photon absorption changes the mass into masstime, which is as different from mass as impulse (Ft) is different from force (F). At the next instant, the excited $(m+\Delta m)\Delta t$ masstime emits a photon $(\Delta E)(\Delta t)$, converting that little $\Delta m$ back into $(\Delta E)$. So the reaction for photon absorption is:

$$(\Delta E)(\Delta t) + m \rightarrow (m+\Delta m)\Delta t$$

This is an "integrating with respect to time" process. Note that "mass" (an observable) has been integrated into "masstime" (unobservable).

The reaction for photon emission—which is from masstime, never from mass, is:

$$(m+\Delta m)\Delta t \rightarrow m + (\Delta E)(\Delta t)$$

This is a "differentiating with respect to time" process. Note that "masstime" (a nonobservable) has been differentiated into mass (an observable).

This fundamental process is what Einstein called an "event" in his theory of relativity.

Note that for a quantum change, an interval ($\Delta t$) exists between consecutive iterations of observation (productions of observed mass from the unobserved masstime). In short, the masstime stated occupies a specific interval of time. But during that interval, there are incredible numbers of smaller (subquantal or "virtual") photon interactions that occur, and in each of these "infolded" or "internal" virtual streams of interaction (within that single macroscopic time interval), each of the infolded little ($\Delta t$) intervals has other even smaller infolded photon interactions within it.

The point is, there is an incredible internal dynamic structuring of the ongoing causal interaction and observation processes. Hence the "quantum level" mass (effect) is in fact comprised of a myriad of ongoing interactions! These in fact constitute "engines" and their specific formats and dynamics comprises the "template". Any template has an internal structure of finer potentials.

Observation thus is irrevocably linked with the virtual state, very precisely, via the "nested engine" concept. This means that, electromagnetically, by engineering this internal structure (which also represent sets of dynamic spacetime curvatures), we can engineer and change the resident engine of a mass (continual observation assumed!). We can "get at" the ability to do this by using Evans' O(3) electrodynamics, which is a subset of Sachs' unified field theory.

Mass (continual observation assumed!) is of course highly compressed spatial energy, compressed by the factor $c^2$. By the "engines with infolded engines" concept, we actually are defining energy itself. We will attempt a new definition of energy, which of course must still be further examined by foundations scientists for any unperceived flaws: Energy at any local region of spacetime is the complete set of differences in the engine-set of that region from the engine-set of average or ambient spacetime. Energy is thus a special form of "spacetime excitation" or "spacetime charge". It is also a difference engine. It is also an "engine potential", so to speak. Note, however, that the excitation and charge (the differences) are not

just in the 3-space domain, but also in the time domain as well.

Since energy can be time-reversed in one form—e.g., in the well-known time-reversal of uncompressed EM transverse wave energy—then it can be time reversed in another form; i.e., in mass-energy (compressed) form. We can do that with a variation and extension of nonlinear optical pumping, but we must pump in the time domain rather than in the 3-spatial domain as is normally done.

In short, we propose time-pumping as the process for making a precise antiengine, exactly corresponding to a resident engine, but time-reversed and perhaps amplified.

Time-Reversal and Pumping

As an example, suppose we have a nonlinear mass that acts as a phase conjugate mirror (PCM) (as continually observed!). If one pumps the mass in 3-space with normal EM waves, one can create an exact phase conjugate replica wave—including one that is amplified—that travels back in spacetime precisely over the 3-space trajectory previously taken by the stimulating "input" or "signal" wave itself. Since one does not observe the time element but only 3-space, one observes a 3-space EM wave traveling backwards in 3-space precisely over the previous 3-space path we observed the stimulating wave to have taken.

We can think of pumping as a sort of triode action. As continually observed, if we input a 3-spatial energy wave oscillation as the engine stimulus, we have inputted its 3-spatial template which is actually a 2-dimensional wavefront and its dynamics. By pumping the PCM in 3-space with other 3-spatial energy wave oscillations, we produce a time-reversed 3-space replica wave with parity reversed. Hence we get the poorly named "distortion correction theorem", which states that the 3-space phase conjugate replica wave will progressively appear point by point back over the spatial path previously taken by the 3-space input signal wave. Again, as continually observed. We must never forget that each and every 3-space "snapshot" exists only at that exact moment in time. The next instant, things are back to unobserved 4-space things. Observed mass-at-an-instant, e.g., returns to nonobserved masstime.

In short, by spatial template input and spatial energy pumping for a 3-space wave, we time-reverse and amplify the 3-spatial input wave and its energy. So we time-reverse a 2-dimensional object—the EM wavefront—and its energetics.

Similarly, though not yet in nonlinear optics, if we input a 4-space template and 4-space energy, we will produce 4-space phase conjugate reversal. In that case, we time-reverse a 3-dimensional object: the pumped mass (the PCM) itself. Note particularly that, for EM energy to be 4-spatial, it must exist at least in the time domain, and it exists in nonobservable form. Otherwise, it is normal 3-space energy as existing in some observation being applied.

4-Space Pumping and Time-Reversal of Mass

First, consider the 4-template of spacetime curvatures (the engine, when its energetics as well as its form are considered) that is resident in the pumped nonlinear "mass". Elsewhere we have advanced the exact mechanism by which a mass propagates through time, and thus even "persists" or seems to, as we continually and repeatedly observe it. In that mechanism, the mass continually changes (in each part of it) from mass to masstime to mass to masstime, and so on, due to the incessant photon interactions at all levels, including the virtual photons of the vacuum itself.

When we pump in spacetime (4-space), we must consider pumping the "persisting mass" and every element of it down to the smallest level, during the "masstime" state of every differential element of the "persisting mass". More simply, we may just say we are now pumping the PCM as a "masstime" PCM, and we are pumping in 4-space rather than 3-space. In this extended form of pumping, we produce a precise anti-template in 4-space mass-time-energy rather than just in mass-energy. The result of that pumping is an amplified anti-engine that precisely returns that pumped 3-space mass—continual observation now assumed!—back over its previous time-like trajectory, changing its 3-space physical form (its mass) in the process.

So we may time-reverse the pumped living cell itself, in situ, and in the process we will time-reverse all its parts even down to the tiniest. Mathematically, time is multiply connected; each and every tiniest part of that cell exists in each and every single moment of time simultaneously. Thus, pumping in the time domain pumps the entire cellular mass-energy and time-energy and all the dynamics of both forms of energy (time and mass).

Deviating the Time-Pumped Mass from Returning to Its Past Condition

As observed, we can readily deviate the time-reversing mass off its "past time trajectory" to any desired new physical state, by simply inputting an additional "delta antiengine" that will move the mass away from its past time path to the desired off-trajectory physical state. This gives a special kind of reality to "probability" and "possibility", where they now mean "potentiality". The point is, by adding additional engines as additional "input" signals to the time-pumped mass, we can rigorously control what the pumped mass becomes (changes into). We can thus move it forward in time (redifferentiation) or backwards in time (dedifferentiation), or off-trajectory in either direction so as to reach "possible" states in potentiality itself.

Physical Engines and the New "Signal Wave" Input

In ordinary nonlinear optics (NLO) there is no consideration of the structuring and dynamics of the time element (time-stream) associated with the visualized "flow of a mass through time". This restricts NLO to a subset, since every element of the mass-energy is in continuous interaction with its own local dynamic spacetime curvature sets, and that may include time-pumping as well as 3-space pumping. The overall coordination of the local effects is

generated by the overall coordination of the local causes.

Considering its masstime state also, every "mass" has a resident dynamic 4-space energy (energy in space and energy in time) with a dynamic template, and there is an ongoing continuous two-way interaction between the "mass-energy" on the one hand and the "spacetime curvatures and their dynamics" on the other hand.

Every engine involves structures and dynamics both in the time domain and in 3-space. Indeed, it is not possible to "curve 3-space" alone, without simultaneously "curving the dynamics of that space's "persistence in time". In short, one affects and alters the dynamics of both space and time whenever one alters the dynamics of either of them. For a mass (momentary observed state!), one alters the dynamics of the mass-energy and its associated time-energy, immediately thereafter when the observed mass has returned to its unobserved masstime state.

Biological Dedifferentiation and Redifferentiation

In biology, simply pumping the cell in the time-domain results in what is known roughly as dedifferentiation of the cell—return of the cell back to a more primitive form; actually, back to an earlier physical state or condition.

As an example, Becker's bone-fracture healing experiments clearly showed such initial dedifferentiation of red blood cells caused by having a simple electrical potential across the fracture site. Becker rigorously showed that, in the local fracture region where "bone" was the cellular normal, so long as the resulting cellular change state (first, dedifferentiation) differed from the bone, the action of the potential continued to time-reverse whatever "delta" existed between the exact condition of the changing cells and the cells in the area.

The red blood cells first dedifferentiated by shucking their hemoglobin and growing a cellular nucleus. They then redifferentiated into the type of cells that make cartilage (which is "approaching" the bone state but not there yet. Then these new cells redifferentiated further into the type of cells that make bone, and were then deposited as bone cells to heal the fracture. We point out that redifferentiation is actually "time-forwarding" the physical state of the cellular mass-energy and its dynamics. When the delta reverses, the time-direction of the anti-engine reverses.

Without a clear understanding of it, that bone-healing procedure is used in many hospitals today to heal otherwise intractable bone fractures. In short, experimentally it has been proven to work.

We also comment that the entire foregoing topical discussion is as continually observed. The actual causes (the engines) were not observed, since they are in fact nonobservables.

The Cellular Regenerative System Pumps Damaged Cells in the Time Domain

Becker also studied the cellular regenerative system of the body, The regenerative system is an electromagnetic system, but one of novel and advanced electrodynamic kind.. Unfortunately, Becker only had available to him the standard U(1) electrodynamics, which does not include curved spacetime and engines. Also, at the time (1960s) he performed his seminal experiments, modern nonlinear phase conjugate optics itself had not yet been born—it did not start in this country until visiting Russian scientists briefed Lawrence Livermore National Laboratory in 1972 about the "strange wave that emerges and restores order". Even then, it really was not well underway in the U.S. until 1978-1980. Hence Becker was unable to complete the modeling of the regenerative system.

Specifically, with U(1) electrodynamics thoroughly confusing the effect wave as the causal wave, Becker was unable to advance the complete EM unified field engine mechanism that directly produced the cellular changes necessary to reverse cellular damage, regrow missing cells, and change cells from one form to another. He did capture the biochemical aspects and cellular change aspects very nicely. He captured the accompanying EM aspects perhaps as completely as they can be expressed in ordinary U(1) electrodynamics, which cannot deal with time-reversal of mass-energy, or with spacetime curvature engines and templates. Becker's work was epochal, however, and he was nominated multiple times for a Nobel Prize.

Becker Was Suppressed for His Achievements and Courage

Sadly, for his noble efforts and also because he had the courage to speak out against the biological hazards of non-ionizing weak EM radiation, Becker was rather ruthlessly suppressed. His funding and grants were withdrawn and not renewed. Eventually he was forced to retire early. Very powerful scientific forces were arrayed against him and against others also speaking out.

In police work, there is an old dictum: To search for the culprit, follow the money trail and look for the motive. The continuous weak EM hash that is radiated from power lines ubiquitously was the center of the issue courageously raised by Becker and others such as Marino, including their testifying as EM bioeffects experts in court cases. Whereupon institutes were set up and funded rather handsomely by the electrical power industry to "investigate the biological effects of weak EM radiation". Needless to say, the scientists employed by these institutions largely found that the effects were negligible. This provided a large body of scientific papers and scientists testifying that the entire EM bioeffects scare was a no-brainer. And so it has largely remained to this day, in the "official" scientific view. Even an editorial in the journal Nature has raised a question of the scientific open-mindedness of institutes funded by an industry being investigated or held in question.

However, now that we understand templates and engines, let us explain the Becker work and

the mechanism utilized by the cellular regenerative system to restore damaged cells back to normal.

## The Immune System Heals Nothing

The immune system, so necessary to fight off pathogens etc., actually heals (restores) nothing at all, not even its own damaged cells. Of course the immune system is absolutely vital; it is like a great army that defends us against continuous and unending assaults on all fronts. We could not live without it, and those unfortunate persons having suppressed immune systems are forced to live in environmental isolation, special suits, etc. Otherwise, invading pathogens would quickly kill them.

When the immune system battles against hostile invaders and wins, it usually litters the battlefield in the body with dead cells and residue, and there are many living but damaged (and even diseased) cells remaining. The immune system's large cells "clean up the dead residue", and then the immune system's work is finished.

The array of damaged cells in the body in that area are restored (within its limitations) by the cellular regenerative system, not by the immune system. Since it must cause cellular restoration, its key functions must operate in the causal domain, not the effects domain. Those causal functions must also be highly and specifically organized and correlated to the specific effects in (state of) the individual damaged cells and all tiniest parts of them. So how does the regenerative system prepare such marvelously tailored, specific causal engines to restore a damaged cell back to health? For that we shall have to re-examine the scalar potential.

## The Unsuspected Dynamics of the "Scalar" EM Potential

First, the innocent-appearing little "scalar electrostatic potential" is a real tiger in disguise. In 1903, E. T. Whittaker—one of the leading mathematical physicists of his day—showed that in normal U(1) electrodynamics the scalar potential decomposes into a harmonic set of bidirectional EM wave of special kind. This harmonic set is actually a set of longitudinal EM waves, in perfect "bidirectional" phase conjugate wavepairs. That is the way that Whittaker (and everyone since) interpreted it—as if continually and repeatedly observed.

## Effect Wave Versus Causal Wave

We now meet face-to-face a primary flaw in the conventional interpretation of electrodynamics. That is the ubiquitous use of the EM effect wave in 3-space—produced after the "causal EM wave-in-spacetime" is interacting with charged 3-spatial mass and has had a d/dt operation imposed upon it—as if it were also the causal EM wave actually existing in (persisting in) 4-space prior to interaction, and thus prior to imposition of d/dt. In short, the causal EM wave is an LLLT entity existing not only in space but also in time, while the effects wave is an LLL entity that is observed only by repeatedly imposing d/dt(LLLT) = LLL 3-

space intersection snapshots at successive "frozen moments" in time.

The effects EM wave does not even exist or persist in time, a priori. It "appears" to do so to the observer by the observer's continual rapid reiteration of the observation d/dt process. Actually a series of 3-space snapshots—with memory recall—is how the observed entity is "assumed to persist". The snapshots themselves are not the "existent" entity in the form that it does persist! They are the continual perturbations and cuttings of persistence.

An entity persists except when it doesn't. It is persisting when unobserved, and is not persisting in the form as repeatedly observed. Without belaboring, we point out that the problem of being and persistence are unsolved problems in philosophy as well as physics. Centuries of philosophers struggled with the problem of being and failed to solve it, because all of them continued to confuse the "observed" instant which does not persist in such form at all, with the unobserved persisting entity. The forms of the observed entity and the "same" persisting entity are dramatically different. The existing entity may be said to be "the observable entity multiplied by time". This is readily seen geometrically; the observable entity is 3-spatial (LLL) and instantly a frozen partial snapshot. The nonobserved, persisting entity is 4-spatial (LLLT) and a flowing process.

The thing the philosophers (and the physicists) have struggled with is that any entity exists (persist) not only in a series of frozen instants "as observed" and as "not persisting", but also as an ongoing process which is not and cannot be observed a priori. Elsewhere we have shown that Aristotelian logic is incomplete and destroys itself like a snake swallowing its own tail. We advanced the completion, which is a 4-law logic with an application rule which itself is a 5th law of logic. Hence the problems the philosophers and physicists have struggled with remain unresolved largely because of the use of an incomplete logic. Such fundamental foundations issues cannot be resolved in Aristotelian logic, which does not model such solutions. The issues can be resolved in 4-law logic.

In 3-space (i.e., after we "detect-as-observed" an effects wave from the ongoing interaction of a causal wave with a previously observed 3-space charged mass), Whittaker's interpretation of the decomposition does apply in those iterative "frozen momentary snapshots" only. That is the effects decomposition (the effect EM waveset) that would be detected—by continually interacting the actual causal decomposition waves in spacetime with charged mass. But such a pure effects interpretation has omitted and altered something very vital indeed: The actual form in which those waves exist prior to complete interaction and observation is 4-spatial, not 3-spatial. However, to have an "interaction" at all, that will produce an effect, we must introduce not only the 4-space causal interactant(s) but also a previously observed 3-spatial entity steadily being "observed". Reflect on that for a moment! We cannot have a cause and effect action, unless we have a causal set interacting with a previous effect (a previously observed observable) to produce a change in that prior observable—i.e., to produce a new effect.

So a "new snapshot" series (observations) taken of the persisting interacting causal entity (the cause) and an ongoing series of iteratively snapped sequences of the "interacting" observable (initial effect) will iteratively reveal the changes occurring in the "initial observable". That is the "output effect" of the interaction (observation) process. Note the multiple use of observation infolded within observation (a comparative process a priori) interacting with an ongoing unobserved cause, to produce a steady series of effects which are "changes" when compared to the initial observable.

In the comparative recall process of the observer, if iterative comparisons between the continually outputted "changes" are zero, then the initial observable is "seen or accepted" as "continuing to persist". But this very notion of "the observable continuing to persist" involves this rather complex interaction process ongoing, as well as the observer's continual recall from memory and comparison. In our paper extending and completing Aristotelian logic, we pointed out that identity itself is a determination made by comparison of one observable with a recalled previous observable. This process of the observer is continuous and automatic; it is the way that the operation of perception itself is designed and functions.

How the Effect Wave Came to Be Confused as the Causal Wave

In electrodynamics, the founders (Faraday, Maxwell, Heaviside, etc.) all conceived a material (as continually observed!) ether. In short, there was not a single point in all the universe—so they thought—where mass was absent. Hence the "EM field in space" was a very real and material thing to them, and "massless" field was not even in their minds. Indeed, Maxwell modeled his electrodynamics as a purely material fluid flow and dynamics theory, originally using a very mechanical model of the "ether" replete with gears and wheels.

Sadly, note that this "material ether as if continually observed" concept already completely substituted spatial effects for all spatiotemporal causes. This seemed natural; in confusing force as cause, "natural philosophy" (as physics was known early on) had already hopelessly confused effect with cause in mechanics, therefore in fluid dynamics. And it was material fluid dynamics that Maxwell utilized and adapted as the model to capture his electromagnetic theory. One cannot fault Maxwell; almost all scientists had already confused cause and effect long before Maxwell was born.

During the same EM formative period (Maxwell in the 1860s and 1870s, and then in the 1880s after Maxwell was deceased), special relativity had not yet been born—it would be two more decades before it appeared. The notion of "spacetime" did not exist as we conceive it today, and neither did the notion that the flow of time changed its pace. Indeed, the very notion of the "flow of EM energy through 3-space" appeared in electrodynamics (and in physics) only in the 1880s, several years after Maxwell's death in 1879, and introduced by Poynting and Heaviside independently. Prior to that, the notion of energy propagating through space did not even exist in physics. E.g., from an editorial, "The Transfer of Energy," The Electrician, Vol. 27, Jul. 10, 1891, we quote as follows:

> "...the idea that energy is located at all, and that, when it changes its position, it must move along a definite path, is quite a new one. The law of the conservation of energy implies that energy cannot disappear from one place without appearing in equal quantity somewhere else; but, although this fact has long been accepted, it is only within the last few years that the idea of transference of energy has been developed, or that anyone has attempted to trace out the actual path along which energy flows when it moves from place to place. The idea of an energy current is of more recent date than the electromagnetic theory, and is not to be found explicitly stated anywhere in Maxwell's work. We believe that the first time it was applied to electrical theory was in the pages of The Electrician, by Mr. Oliver Heaviside, to whom so much of the extension of Maxwell's theory is due. The idea was also independently developed and brought to the notice of the Royal Society in a Paper by Prof. Poynting."

Also, in that formative period, instead of conceiving a variable space and time, time and time flow were thought by those pioneering scientists to be absolutely immutable.

Further, no clear notion of the observation process existed, and in fact such was not made possible until after the advent of quantum mechanics, much later.

So in all the early EM founders' minds, the incoming EM wave in "spacetime", prior to its interaction with charges in the detector or receiving circuit, had already interacted with mass, and was continually interacting with mass, and was in fact a "wave of very thin mass". It was —so they believed—entirely a material wave in a material medium. So Maxwellian electrodynamics is rigorously and completely a "material medium with material waves" model. Specifically it is a material fluid dynamics model. But as a quaternion algebra model, it is still a better EM model that the U(1) electrodynamics model we use today! Barrett points out the diminishing of Maxwell's theory very nicely:

> "[T]he A field [for the potentials] was banished from playing the central role in Maxwell's theory and relegated to being a mathematical (but not physical) auxiliary. This banishment took place during the interpretation of Maxwell's theory... by Heaviside... and Hertz. The 'Maxwell theory' and 'Maxwell's equations' we know today are really the interpretation of Heaviside... Heaviside took the 20 equations of Maxwell and reduced them to the four now known as "Maxwell's equations." [Barrett, Terence W., "Electromagnetic Phenomena Not Explained by Maxwell's Equations," A. Lakhtakia, ed., Essays on the Formal Aspects of Electromagnetics Theory, World Scientific Publishing, River Edge, NJ, 1993, p. 11 and generally pp. 6-86.]

Heaviside was particularly antagonistic to potentials, and believed firmly that only the force fields (continual observation unconsciously assumed!) were the causes of EM phenomena. In short, he completely confused cause and effect in electrodynamics, from the getgo. He was a brilliant, lone scientist, self-educated, and thus passionately convinced of what he worked out. Nahin, a biographer of Heaviside, states:

> "In an 1893 letter to Oliver Lodge, Heaviside said of his own work that it represented the 'real and true "Maxwell" as Maxwell would have done it if he had not been humbugged by his vector and scalar potentials." [Nahin, Paul, Oliver Heaviside: Sage in Solitude, IEEE Press, New York, 1988., p. 134, n. 37.].

In fact, Heaviside did not even understand the potentials, and it is questionable even today how well they are understood by modern physicists. In Heaviside's own words:

> "… a function called the vector potential of the current and another potential, the electrostatic, [work] together not altogether in the most harmoniously intelligible manner —in plain English, muddling one another. It is, I believe, a fact which has been recognized that not even Maxwell himself quite understood how they operated." [Oliver Heaviside, Electromagnetic Theory, Vol. I, p. 69.]

One must also realize that, in all the world in the 1880s, there were perhaps some three dozen electrodynamicists. So the mindset and actions of only a few could and did set the course of history for all of electromagnetics for more than a century.

Heaviside also despised quaternions, and reasoned that "the poor electricians"—the term for electrical engineers in those days—would never be able to understand such a complicated mathematics. He also believed that adding a vector component and a scalar component in a single quaternion component was against the very laws of nature. That is why his subset theory was in vectors; he ruthlessly rooted out that scalar component of the quaternion, converting it to a vector.

But Heaviside's theory was far more easily understood and applied. The "poor electricians" were struggling to build transformers, put in telegraph lines and systems, etc. Heaviside published a series of practical engineering-type papers dealing with such subjects, which were of great assistance to the struggling young electricians. Consequently vector electromagnetics spread relatively rapidly, in its own limited way.

Then in a short "debate" in a few journals, never involving more than a few scientists and with the important action occurring in a single journal, Nature, the vectorists simply threw out the quaternion and the quaternionists, and vectors (and then tensors) became the accepted electrodynamics. Lorentz had also regauged the vector equations to make them even simple and symmetrical, and much easier to solve with closed solutions rather than numerical methods. This final subset (which is the subset taught to electrical engineers and most scientists to this day) also had one other unfortunate consequence that was to lead to massive pollution and great damage to the modern biosphere: Lorentz's symmetrical regauging unwittingly discarded all those Maxwell-Heaviside EM systems that were open systems far from equilibrium in their active environment (such as the modern active vacuum). In short, it arbitrarily discarded all electrical power systems which freely received and used excess energy from the active vacuum, to power themselves and their loads simultaneously, or to output

more energy than was input to them by the operator.

We know today that a "material fluid model" of electromagnetic fields is wrong in its very foundations, and particularly with respect to how the "field" in spacetime prior to interaction is modeled. Eerily, those "material ether fluid" equations have never been changed in classical electrodynamics to the present day, even though outstanding physicists—such as Nobelist Feynman and the great John Wheeler—have emphatically pointed out that the "field" as conceived and modeled by the Maxwellians does not and cannot exist as such in massfree space (where "space" refers to massfree spacetime. The use of "space" for "spacetime" is a little non sequitur widely used and accepted in physics.). More rigorously, such an observable does not and cannot persist as such, since it is actually only a single frozen "snapshot" in 3-space, after the observation process has been applied. It does not and cannot persist even in perception, unless the observation process is continually iterated. No effect and no 3-space entity persists without continual repetition of the causal interaction in the observation process. Even then, rigorously it "persists" only in "persistent and ongoing observation". Without observation, it does not exist at all.

But so ubiquitous in physics is the confusion of cause and effect, and the relation of causality to continual iterative observation, that even those physicists noticing the non sequitur in the "force field in vacuum" modeling were unable to completely correct the error. The reason is straightforward: The problem is endemic throughout most of physics, not just in one area. It is endemic in statics and dynamics as well as in electrostatics and electrodynamics. Its correction calls for essentially a massive redo of much of physics from beginning to end, and it will require a decade of sustained effort to root out the present metastasized "cause and effect confusion" cancer that has spread throughout the complete body of physics.

The greatest barrier to even recognizing the magnitude of this problem is that almost all the language developed and used to describe these physical phenomena, principles, etc. itself is highly convoluted with this confusion of cause and effect. The greatest barrier is the habitual phraseology and embedded confusion we have all "imbibed with our mother's milk", so to speak, as Einstein put it.

Only a Subset of Maxwell's Theory Was Selected and Retained

Maxwell died in 1879 of stomach cancer, about the time that Heaviside began re-interpreting Maxwell's 20 quaternion equations in 20 unknowns, into a highly simplified subset of some four vector equations as written today. This modified "Maxwell-Heaviside subset" is what is taught in university today as "Maxwell's equations".

Not a single one of those equations ever appeared in any paper or book by James Clerk Maxwell! They are Heaviside's equations, and also the same as or similar to work by Hertz and by Gibbs. The Heaviside equations are only a limited subset of Maxwell's electrodynamics and Maxwell's theory. Quaternion algebra has higher topology than even

tensors, much less vectors. So one can do a great many things in Maxwell's quaternion electrodynamics (or better yet, in Clifford algebra electrodynamics) than are taught in university in tensor electrodynamics or vector electrodynamics.

Again, Barrett says it nicely:

> "Armed only with differential calculus there is no awareness that field dynamics is held hostage by the topological restrictions determining the algebraic logic. This view raises a question of importance to those seeking a unification of all forces. Perhaps unification of other forces with electromagnetism needs to be with a higher order symmetry form of electromagnetism than the U(1) form." [Barrett and Grimes, Eds., ibid., p. ix-x.].

Dualizing the "Field" Concept

Now let us see what the notion of the "material ether universal medium" did to the field concept. It meant that the incoming "fields" in the wave oscillations were absolutely material wave oscillations of a matter medium. Faraday used his lines of force as actual physical taut strings in that physical material "ether" medium (with continual observation implicitly assumed). Hence to Faraday, disturbances in the ether before reaching the detector or antenna were "pluckings" of those taut strings.

That is where the notion of the transverse EM wave in vacuum (actually in a material ether filled with taut strings) came from. As he directly states in his 1873 book, Maxwell deliberately captured Faraday's concepts in his (Maxwell's) mathematical theory.

Again, all this was "as continually observed" by assumption. The entire modeling apparatus thus substituted the effect wave for the causal wave.

Extremely Limited Physics Knowledge At the Time

At the time (1860s to early 1880s) that electrodynamics was developed, the electron, atom, nucleus, etc. had not been discovered. "Electricity" was envisioned as a thin material fluid flowing in the wire, much like water flowing in a pipe. For an incoming perturbation in spacetime reaching the wire, the "shaking of the electric fluid" in the wire was thought to be just an "interception" of the "shaking of the electric fluid" that was incoming. "Charge" meant only "a piece of electric fluid". There was no knowledge that the wire had positive charges in the nuclei as well as negative charges in a Drude electron gas. At that time, in their minds there did not exist the concepts of electron, nucleus, nucleons, positively charged nucleus, atoms, etc.

Today, we know that the Drude electrons in the conductor move very, very slowly down the wire (e.g., along a receiving antenna) at a drift velocity (nominal case, a few inches per hour). The actual disturbance (signal) races down the wire at light speed (perfect conductor) or near-

light speed (good but real conductor). The Drude electrons, having spin but restrained from longitudinal translation to any great degree, interact with the streaming signal and its energy flow. The Drude electrons act as gyros and thus precess laterally in the conductor since they are very restrained longitudinally.

Thus with our instruments we actually measure electron precession waves and their lateral translation in the detecting wire medium. These detected waves are unconsciously thought of as continually observed. We do not measure the "signal as it exists prior to interaction", but only the "signal comprised of the material-waves (electron precession waves) after the interaction, with continual interaction and continual observation assumed". In short, we measure the 3-spatial effects wave in matter, assuming it persists (continual observation process!) and then erroneously still assume—as the old guys did—that the same "effects wave" is identical to the causal wave that existed (and did persist a priori) in massless spacetime (prior to interaction) where there are no observable Drude electrons with precession.

However, the old founders considered the detection of "transverse vibrations" in the conductor as positive proof that the incoming "material fluid vibrations" that had been intercepted were also transverse waves and therefore "taut string" vibrations, just as Faraday and Maxwell had assumed. To them, transverse electric fluid oscillations came in, and those transverse electric fluid oscillations were detected as the perturbed motions of the electric fluid in the conductor.

That can easily be falsified today, if one considers not only the perturbation of the electrons in a conductor, but also the simultaneous perturbation—with equal energy—of the positively charged atomic nuclei. Nonetheless, since no such "opposite-sign, equal energy, highly damped, antiphased vibrations in the same wire" were known in those days or detected then, electrodynamics has never been changed to correct its erroneous model of "transverse" waves in the vacuum.

The actual EM waves in 4-space are quite unique. A priori they contain not only a 3-space EM energy component but also a precisely correlated EM time-energy component. They would best be represented as a pseudo-longitudinal EM 3-space wave, multiplied by time so as to constitute a 4-space wave of pure spacetime curvature oscillations.

Consequently electrodynamics still erroneously omits Newton's third law reaction, even though the reaction effect has an electrodynamics cause. Expressing electrodynamics as part of a unified field theory—as in O(3) electrodynamics—brings in the general relativity aspects and therefore the mutual interaction between spacetime curvature and EM energy (both 3-space EM energy and EM time-energy).

Whittaker's Decomposition Shows the Primacy of Longitudinal EM Waves

However, Whittaker's 1903 decomposition of the scalar potential—and his interpretation of it—reveals the importance and primacy of longitudinal EM waves as "effect" waves after

detection.

Further, since the modern vacuum is proven to be highly energetic and thus has high energy density, its energy density constitutes a scalar potential. Hence the Whittaker decomposition can be directly applied to the vacuum itself, but first the decomposition must be re-interpreted as a causal decomposition rather than an effects decomposition.

To be rigorous, we must not use the commonly accepted "effects" 3-space waves after mass interaction, which to date everyone has previously utilized to interpret the Whittaker decomposition. We thus have the problem of re-examining and re-interpreting Whittaker's effect waves interpretation of his decomposition of the detected potential into the causal domain, which means we must work "backwards" across and with the observation process itself. We must decipher which of Whittaker waves are effects waves after interaction with charged mass, and which are (or should be represented as) causal waves prior to interaction with charged mass.

The Quiescent Vacuum as Spacetime and as a Scalar Potential

Before the imposition of vacuum energy fluctuations—from dynamic local nonlinear wave interactions engendered by very large numbers of passing waves from far emitters—the "quiescent vacuum" would be a very nice scalar potential, but one of extreme energy density. The dynamics of all source charges everywhere, however, produces myriads of waves, and their wave-to-wave nonlinear interactions and changes are occurring at any instant through any finite vacuum volume element.

Hence the entire dynamic charged universe participates in producing the local, very large but very fast, EM fluctuations or "zero point energy fluctuations" of the vacuum. This is in accord with Puthoff's "cosmological feedback principle" which shows a causal feedback, but one where the causal information is unavailable. Hence statistics is still required for calculation.

Requirement for Hidden Order and Its Implications

In the Sachs-Evans theory, one does not have to assume random statistics! We would say the situation is chaotic, because our knowledge of each particular change may be either nonexistent or highly limited. These changes and their causes for which we have no information are therefore "hidden variables". They constitute a hidden causal order inherent in that apparent statistical disorder of the seething zero point vacuum energy interactions. Nonetheless, we can legitimately take the view that there is an underlying order inside what appears to us to be "random" (no ordering information at all is available) changes.

This of course deals directly with the great problem of quantum mechanics: Its assumption of random change eliminates the entire observable integrated universe, because integration of randomness just yields more randomness, not the observed macro order at all. So QM

scientists know (and many will even admit) that there has to be hidden order and thus chaos, or else quantum mechanics is wrong. This is the recognized "problem of the missing chaos" in quantum mechanics. However, QM scientists still have not changed their statistics to an "already chaotic" statistics, except in case of something like the Bohm hidden variable theory. Bohm's theory does yield all the correct answers as well as the Bohr interpretation does. However, in theory the Bohm hidden variable theory would appear to be causally engineerable, whereas Bohr's theory is not. Engineering the hidden longitudinal EM waves comprising the interior of every normal EM wave, field, and potential is the way to causally engineer Bohm's theory.

Carried deeply enough to consider the observer's knowledge or lack of knowledge of the hidden causes themselves, a causal model does indeed correctly model the vacuum, its fluctuations, and its exchanges. This means that, given the proper approach, we can model most situations of vacuum energy exchange with EM circuits and systems in terms of purely causal electrodynamics. But we will have to deal with the fundamental "hidden variables": the infolded longitudinal EM waves and their dynamics. This includes the always present, associated, perfectly-correlated EM longitudinal waves in the time domain. When one electromagnetically structures 3-space EM energy, one first electromagnetically structures EM time-energy as a precise causal template.

In short, all 3-spatial EM energy comes from the time-domain. Or put another way, all 3-space EM energy is the effect (output) of an interaction of unobservable causal time-domain EM energy with observable (i.e., "as continually observed") 3-space charges.

Since all EM energy comes from the time domain, then if we engineer the time domain itself, we can in theory produce and direct EM energy wherever and however we wish—including, e. g., inside the nucleons of the nucleus, to "flip" quarks and accomplish isomer transmutation. Since every part of an object is multiply connected in each time moment and interval, by using the time domain we completely overcome the notions of "outside" and "inside" and "propagation of energy through 3-space".

From Whittaker's work, by reinterpreting the longitudinal 3-space phase conjugate waves (continual observation assumed!) into unobserved longitudinal 4-space waves as necessary (before they were observed), we immediately see the overwhelming importance of various kinds of longitudinal EM waves. Indeed, we can electromagnetically decompose all spacetime curvature "engines" and "templates" into sets of longitudinal causal EM waves and their impressed dynamics.

Here a higher symmetry electrodynamics such as O(3)—and one which is also a subset of a proper unified field theory, which O(3) electrodynamics is—is required. O(3) electrodynamics fits the modeling requirements nicely. Indeed, in O(3) electrodynamics the Whittaker decomposition itself is expanded and very much enriched to include not only potentials and waves and fields with "regular" linear internal structures, but also potentials and waves and

fields with "nonlinear" deterministic internal structures.

In short, the O(3) electrodynamics allows the direct modeling of engines and templates carried infolded inside "normal" linear-appearing EM fields, waves, and potentials due to the infolded exact pattern of curvatures of spacetime and their dynamics. It is all simply those infolded longitudinal EM waves—both in 3-space and in the time domain—and their imposed dynamics.

The quiescent background potential of the vacuum does indeed decompose into quite regular longitudinal EM Whittaker phase conjugate wavepairs, prior to the imposition of the additional dynamics and interactions due to interior longitudinal EM waves from all sources in the universe. Let us examine a single EM longitudinal wavepair in the composition of the quiescent vacuum potential.

We call strong attention to this: The 3-space form of a wave, expressed as a function of time (i. e., giving the value of the effect wave at any point in time where time has been stripped away and zeroed) is not a 4-space causal wave, but merely an iterated set of frozen 3-space snapshots, much like the static frames of a motion picture film. F(t), where F is a 3-space entity, is not a 4-space entity. It does capture the effects changes that are observed to progressively occur in the observed 3-space F as iterative observation continues.

Observation/Detection Is a d/dt Operator

When a 4-space wave is detected (i.e., interacts with charged mass which provides a d/dt operation), the detection or "observation" interaction strips away time and leaves an instantaneous 3-space frozen snapshot of the 3-space intersection of what was an ongoing 4-space interaction. As is well-known, all observation is spatial and yields a 3-spatial result. Time is not observable, even in theory, according to QM itself.

Implications for Electrodynamics

In assuming the material ether, the Maxwellians inappropriately applied that d/dt observation operator to the incoming nonmaterial wave in spacetime before it interacted with the detecting charged matter! That is a non sequitur today, and one of primary magnitude. It in fact substitutes the "effect" wave as the "cause" wave, even though the two do not even have the same dimensionality.

Much of physics (and especially electrodynamics) has wrangled over this so-called "duality" of field theory and the field concept for a few decades now. But electrodynamicists have not corrected the EM model foundations themselves, but have settled on just using the word "duality" as a smooth "spin control" term. Therefore they have continued to maintain and propagate a monumental foundations error in the classical EM model.

O(3) Electrodynamics Corrects the Duality Error

The Sachs-Evans theory deals with that non sequitur and corrects it, since the field is conceived in 4-space as a spacetime curvature from the beginning. So the true spacetime causal field—which is a curvature of spacetime—is used in O(3), whereas in U(1) electrodynamics there is still an erroneous assumption that the vibrating spatial EM energy moves through a flat spacetime! As is well-known in GR, any change of the local spatial energy density of spacetime is a curvature of spacetime a priori. Since the EM wave in space is conceived in U(1) as an oscillating wave of spatial energy density, then a priori it must be a propagating wave of local spacetime curvature. Hence the EM wave always moves in a curved spacetime; indeed, locally in a continuously varying curvature of spacetime—in contradiction to U(1) electrodynamics.

As Evans has pointed out, U(1) electrodynamics is therefore an idealized model that is approached but never met in the real world and in real EM phenomena, such as in the highly nonlinear human body. In the new unified approach, the propagating EM wave is treated as the propagating set of spacetime curvatures that it really is. Thus the true 4-spatial "EM causal wave" is used in O(3) electrodynamics.

The body's cellular regenerative system uses nature's actual electrodynamics, including the causal waves in spacetime prior to interaction with mass. The regenerative system uses the associated
4-space curvatures and their dynamics (the causal engines). Let us examine the Whittaker decomposition again, in view of causal (unobserved) wave versus effect (observed) EM wave.

Reconsidering Whittaker's Decomposition

Consider a single Whittaker bidirectional longitudinal EM phase conjugate wavepair in "3-space". Oops! If it's modeled in 3-space, the assumption has already been made that it has interacted with charged mass and therefore has been "observed" or detected. In short, we have already assumed two effects waves. That is a non sequitur. Causality itself requires that for every effect there must be a cause, and there must be an interaction in the middle. Since the theory assumes a source (cause) for any potential, the potential as we have conceived it in the past is the result of a causal interaction and therefore must involve a cause and an effect. Hence we cannot have two effects waves, but we must have a causal wave and an effects wave together. Else we have not specified the ongoing observation interaction as to input and output.

So we have to examine the situation more closely. We have to separate the effects part of the Whittaker decomposition, since the effects waves are as continually observed 3-space EM energy emitted from the "dipole" (any potential and any element of a potential is a dipolarity).

[We point out that "emitted from the dipole" merely means that a 3-space effects component is detectable in any quadrant included in what we call "the effect of the energy emission". Even so, there is a unobserved but accompanying time-energy causal component at each and every point in that "emitted domain" where we measure the 3-space energy.]

In the common language (keep in mind what is observed continually and what is unobserved!), we know we can observe!!! 3-space EM energy continuously flowing from any source charge or source dipole, by actual experiment. [More rigorously, we have 3-space energy observed/observable at every point in 3-space—continual observation assumed!—in the "emission 3-space domain".] Again in the common language, to salvage the conservation of energy law, we have to have the same amount of EM energy flowing into the dipolarity, else we have assumed that the source charge and source dipole create their continuous outpouring of EM energy out of nothing at all. If true, that would destroys the entire energy conservation concept, and also would treat every source charge and dipole in the universe as a perpetual motion machine.

The Maxwellian electrodynamics model and its derivatives have and do indeed implicitly assumed the universe to be filled with these perpetuum mobiles called "source charges" and "source dipoles". Again, as Sen stated,

> "The connection between the field and its source has always been and still is the most difficult problem in classical and quantum electrodynamics."

If we are working in a 4-space frame (spacetime), there is no requirement that energy and energy flow be conserved in 3-space! Indeed, there can be no such thing as energy "flow" in 3-space per se. There is only the "as continually observed" energy changes in 3-space if we are or could be continually observing and examining the effects output of our observation process. The very term, "energy flow through 3-space" is a non-sequitur if we rigorously examine it. We do see that "flow" in our minds by continual recall from our memory and comparison, just as we see the frames of a motion picture on the screen as having motion in out mental perception. Any engineer or physicist, however, will agree that there is no actual motion ongoing in the scenes iteratively appearing on that screen. Each projected frame is absolutely static. The "motion" is created in our minds as a power analysis and perceptual interaction that is automatic.

Instead of "conservation of energy flow in 3-space," there is a rigorous requirement that energy be conserved in 4-space.

The 3-space "real wave" halfset of the Whittaker decomposition is identifiable as a "continually observed, effect" waveset sequence pouring out of the charge or dipole, because all 3-space EM waves are such "effects" waves after interaction has occurred. The 3-field is even defined after interaction, as force per unit charge (charged mass having unit charge) resulting from (after applying d/dt to) the interaction, and as the specific pattern of energy

deviated from the causal
4-wave around an assumed intercepting unit point static 3-space charge. So let us precisely state that the "real" 3-space waves in the Whittaker decomposition (by implicit assumption) halfset are the effect waves we consider in normal corrupt terminology to be "radiated" from the yet-to-be-determined causal waveset interaction with the source dipole charges a priori.

Let us use the simplest model of the dipolarity of a potential (any "scalar potential" is just a difference between two other differing scalar potentials, hence a dipolarity). For visualization, let us employ a real source dipole (continually observed!) , where we separate a positive and a negative charge (both continually observed!) by a finite distance. Let us now examine that scalar potential between the ends of the dipole.

We now relax our incessant use of the term "as continually observed" pointer, and assume that the reader can sort this process out and remain aware of it. When in doubt, one must immediately stop and ascertain what is observed and continually observed (the effects) , and what is not observed (the causes).

The Whittaker decomposition of that "dipole's scalar potential" assumes that the real or "effect" waves are the emitted waves in 3-space, after the incoming causal 4-space wave and the charges in the dipole have interacted. By applying conservation of energy, this means that the remaining phase conjugate waves—prior to their interaction with the charges of the dipole—thus must be in 4-space and not 3-space, and they must be bringing in exactly as much energy as the "real" EM longitudinal waves are radiating away. In short, we must examine these phase conjugate waves in spacetime, prior to their interaction with the dipole charges, and they must constitute the "causal" waveset. In spacetime before interaction with charge, the phase conjugate waves halfset is in the imaginary plane, which is part of the -ict modeling of the time axis (i.e., the fourth axis in 4-space). Hence these longitudinal EM phase conjugate waves in that halfset are incoming causal EM waves in the time-domain. One can easily see that the only variable in -ict is the "t".

Let us bring in some additional information from other parts of physics. In particle physics, the dipole is known to be a broken 3-symmetry in the vacuum energy exchange with the dipole charges. This means that the flow of energy to and from the dipole is not conserved in 3-space, but it must be conserved in 4-space. We can measure the actual radiation of EM "real 3-space energy" from a dipole in all directions, and we can clearly show experimentally that there is no concomitant input of EM 3-spatial energy into the dipole. That is why the dipole has a "broken 3-symmetry" with respect to EM energy flow.

From these considerations, it rigorously follows that all the energy input to the dipole charges, and coming in from 4-space, must be incoming from the time domain, since we experimentally know there is no 3-spatial EM energy input at all. That is why the input energy to the source dipole is not measurable; the d/dt operator of the observation process destroys any ability to detect or measure it, and there was no 3-space component to remain.

In O(3) electrodynamics, there is no great mystery involved in time-like longitudinal EM waves! My AIAS colleagues have already rigorously shown such "time-domain EM energy flows" as primary, in a series of rigorous O(3) electrodynamics papers published in leading physics journals and carried on a DoE website. Some convenient references are cited at the end of this paper.

The Results of Reinterpreting Whittaker Decomposition

Now we have a more rigorous reinterpretation of the Whittaker decomposition waves. Prior to interaction with the charges, the incoming phase conjugate halves of the Whittaker wavepairs are carrying EM energy in the time domain, in time-like longitudinal EM waves. Such time-like EM waves and currents are clearly demonstrated in AIAS published papers.

So, strangely, every dipolar element of every dipolarity (potential) represents a continuous input of EM energy from the time-domain, being absorbed by the dipole charges in the complex plane, and then being reradiated by the dipole charges in 3-space. If we conceive that all EM energy comes from source charges (which are special dipoles) or ordinary source dipoles, then all 3-spatial EM energy first comes to these source charges from the time domain. The incoming time-domain EM energy interacts with the source charges and dipoles which absorb the time-like EM energy and transduce it into 3-spatial real EM energy output. We previously explained the simplest part of that in our Giant Negentropy paper that is on this website. We also explained how the charges perform that transduction of time-like EM energy into 3-spatial EM energy. After a small summary, we will also add the gist of a much more advanced portion we did not tackle in our Giant Negentropy paper.

A More Primary 4-Symmetry in EM Energy Flow

In the Giant Negentropy paper, we advanced our discovery of a great new symmetry—a more primary EM energy flow symmetry between 4th dimension EM energy inflow and 3-space energy outflow (continual observation assumed!), generated automatically by the broken 3-symmetry of a simple dipole—and of a simple charge as a special kind of dipole. Once established, this more primary energy flow continues indefinitely and freely, so long as the dipolarity remains intact. So in conventional engineering terms, we also uncovered the "magic secret" of extracting unlimited EM energy from the seething vacuum, and for converting "time-energy" into 3-spatial energy.

This discovery is totally consistent with the findings of particle physics that the dipole is a broken 3-symmetry in the vacuum energy flux. Note particularly that this broken symmetry involves an unobservable cause interacting with observable charge (continuous observation assumed!) and then the observed changes in that observable charge's energy condition (i.e., it is pouring out 3-space energy (continual observation assumed!). Rigorously this broken 3-symmetry means that some of the absorbed virtual state (disintegrated) EM energy is

integrated by the spin of the charge, and is reradiated as real, observable EM energy (continual observation assumed!). With the Whittaker U(1) approach, we find that the process symmetry for energy conservation uses input longitudinal EM waves in the time domain and output longitudinal EM waves in the 3-space domain. Further, the two domains are perfectly organized macroscopically and causally, with perfect correlation between EM time-energy inflow and 3-space EM energy outflow.

Giant Negentropy

Hence the reinterpreted Whittaker decomposition reveals a startling and an unexpected process for "giant and continuing negentropy" associated with any common dipole (and any charge as a special kind of dipole). My paper, "Giant Negentropy from the Common Dipole" on the DoE website, http://www.ott.doe.gov/electromagnetic/papersbooks.html, and on this website http://www.cheniere.org/, conceptually explains all this to first order, adhering as closely as possible to the "ordinary view" while reinterpreting the "two 3-space (effects) waves" conventional assumption.

The giant negentropy paper is also published in Journal of New Energy, 5(1), Summer 2000, p. 11-23. In that paper, we solved the long-vexing problem of the source charge and its associated EM fields and potentials and the enormous amount of energy that may be in those fields. Unrecognized by most readers of the paper, we also began the clarification (and partially corrected) the incorrect use of the effects EM field as the causal EM field.

Present Quantum and Classical EM Models Grossly Violate Energy Conservation

On the other hand, the present electrodynamics models—both quantum and classical—still implicitly assume that every charge freely creates energy out of nothing, pouring it out continuously to make those fields and potentials. It allows that continuous outpouring of EM energy in 3-space, but without modeling the input energy. That of course is the grossest possible violation of the conservation of energy law. Energy cannot be created or destroyed, but only changed in form. There is no restriction on changing the form of the energy from EM time-energy to 3-spatial EM energy.

The problem was that electrodynamicists could not solve the problem in 3-space energy flow, because it is a 4-spatial energy flow problem and indeed 3-space energy flow is resounding and permissibly violated by every source charge and every source dipole. That is what broken 3-symmetry means, and that has been known for a half century in particle physics. Overall 4-space EM energy flow conservation, however, is rigorously conserved by the proposed solution—and therefore by every charge and every source dipole. Unfortunately classical EM theory presently excludes modeling the vacuum interaction, much less a broken symmetry in the energetic exchange of the vacuum with the EM system.

Return to Time-Domain Pumping

Now we are equipped to understand how a cell can be pumped in the time-domain. The cellular regenerative system uses longitudinal EM wavepairs comprising their scalar potential. Hence the associated sets of causal time-like EM longitudinal EM waves are indeed pumping the cells in the time-domain. This is why Becker's "simple" scalar potential across the intractable fracture zone could produce such revolutionary and astounding cellular mass-energy time-reversal effects, and "fast-forwarding" effects as well.

Extending Nonlinear Phase Conjugate Optics

In considering pumping in the time domain, we change nonlinear phase conjugate optics accordingly. Instead of the input "effects" 3-space signal wave, we use the resident 4-space EM spacetime curvatures and their dynamics (the resident engine and its template) as corresponding to the "signal or input wave" in ordinary phase conjugate electrodynamics. The input is a time-forward engine complete with its template and dynamics. The output is therefore a precise time-reversed engine with an appropriate template and dynamics. Note that we are now directly engineering general relativity, and we seldom if ever experience a flat spacetime. Instead, we are always working in and with and on a curved spacetime.

This Approach Extends the Template Approach in Nanotechnology

This approach provides a vista of extending nanotechnology and some of its concepts into this unified field area. Note that in quantum field theory, the longitudinal EM wave and the time-polarized EM wave (at least the photons so polarized!) already exist in the theory, but heretofore no one knew how to "make" a time-polarized EM wave. Now we know that the incoming wave halves of the common scalar potential already contains time-polarized EM longitudinal waves as causal waves, and 3-space longitudinal EM waves as effects waves (continual observation assumed!).

Reinterpretation of the "Lone" 3-space Longitudinal EM Wave

So the scalar potential is actually a vast set of ultrawideband causal time-domain pump waves and an associated set of effects longitudinal EM 3-space waves (continual observation assumed for the latter!). When any charge interacts with the scalar potential, it absorbs the causal time-domain pump waves and—in conventional unclear language—emits the effects 3-space EM longitudinal waves. The absorbing charges are therefore pumped in the time domain because that is the kind of pumping energy they absorb.

In a living body, if we pump any nonlinear cellular masses with longitudinal causal EM waves —such as can be emitted from an appropriate plasma—the plasma also has simultaneously produced accompanying time-like longitudinal EM causal waves in the time-domain. So unknown to us, we are actually inputting the time-domain pump waves as well. Hence we are

actually pumping the irradiated mass in the time-domain.

The longitudinal EM 3-space effects wave is always accompanied by a correlated time-domain EM longitudinal wave—something previously unknown in physics. One cannot even have a "wave" unless there is an active time aspect of it. If there is a 3-space component of an EM wave, there must be an accompanying time component of it as well, a priori.

Pumping with Longitudinal EM Waves Accomplishes Time-Domain Pumping

In their interaction with what we erroneously think are only longitudinal 3-space EM waves (as if continually observed and not causal), the pumped cells themselves experience the time-pumping from the associated incoming time-polarized EM longitudinal waves they absorb, thereby producing amplified antiengines in perfect one-to-one correlation to the cells' input resident engines. The stronger antiengines overpower the weaker resident engines, thus moving the cells slowly back to a previous physical state. Every smallest part of the cell is so time-domain pumped and so time-reversed physically.

Two Components of the Resident Engine and of the Generated Amplified Antiengine

We separate the resident engine into two parts: (1) the "normal" resident engine component, which would represent a healthy, normally functioning condition if the injured cell were normal, and
(2) the resident "delta" engine component, which represents the exact "engine" for the precise injury, and with its "subtemplate" representing the precise deviation from normal of the injured cell and all its parts, even to the genes and chromosomes.

Visualizing time-domain pumping of the cell with these two "inputs", we see that the overall time-reversed engine or antiengine that is created (and amplified) will also contain two components:
(1) an antiengine that overpowers and time-reverses the normal component action of the resident engine, and (2) an antiengine that overpowers and time-reverses the abnormal component action of the resident engine. The first antiengine component has the effect of just making the "normal" part of the cell a little younger, which is beneficial and rejuvenating. The second antiengine has the effect of time-reversing the abnormal deviation of the cell at the beginning of the pumping. The "delta" or "deviation" condition will thus be slowly eliminated and zeroed during the time-reversal process since originally it was not even present in the formerly healthy cell. Its "path back through time" is a "path back to zeroing".

The overall time-pumping effect is to time-reverse the diseased or damaged cell back to its previous "normal" healthy condition. This is how all biological healing in the living body is accomplished by the cellular regenerative system itself.

This is the long-sought solution to the biological and biophysical problem of healing.

Quoting Jeremy P. Brockes, "Amphibian limb regeneration: Rebuilding a complex structure," Science, 276(5309), Apr. 4, 1997, p. 81-87:

> "It remains a challenge, however, to understand precisely how the combination of tissue repair mechanisms with reactivation of embryonic programs can generate growth, pattern formation, and morphogenesis in an adult animal.

We believe we have now given the solution to that remaining challenge.

The Prioré Procedure and Its Active Mechanism

> "The possibility that some hitherto unrecognized feature of the radiation from a rotating plasma may be responsible for the Prioré effects should not be dismissed out of hand..." [J. B. Bateman, A Biologically Active Combination of Modulated Magnetic and Microwave Fields: The Priore Machine, Office of Naval Research, London, Report R-5-78, Aug. 16, 1978.].

Bateman's intuition was "right on", in the vernacular. The Prioré team used longitudinal EM wave pumping of the whole body by longitudinal EM effect waves from a large plasma tube, without any knowledge of the actual physical mechanism involved. The team consisted of eminent French Scientists who worked with Prioré in the 60s and early 70s. They achieved startling and revolutionary cures of terminal tumors, infectious diseases, atheriosclerosis, and suppressed immune systems in laboratory animals and in some humans clandestinely treated.

For the work, Prioré invented a progressive series of large plasma tube treatment devices for use in the experiments. Essentially he mixed ordinary (transverse modeled) EM waves in a giant plasma tube surrounded by a giant coil. The longitudinal EM effects waves produced by the plasma tube—and their accompanying causal time-like longitudinal EM waves—then were recaptured inside a rippling magnetic field, by simply winding a large coil around the plasma tube and placing the current upon the coil to produce the rippling magnetic field "carrier". This procedure modified the "inner longitudinal EM waves" of the emitted "Prioré ray" that in fact comprise all normal EM fields, potentials, and waves—and also modified their accompanying time-like causal longitudinal EM waves.

Internal, Infolded EM Longitudinal Waves Inside Ordinary EM Entities

Whittaker showed in 1904 that any EM field, potential, or wave can be decomposed into two scalar potential functions (scalar potentials and their impressed dynamics). That initiated what today is known as superpotential theory. Further, in 1903 Whittaker had already shown that each of those base scalar potentials decomposes into the bidirectional EM longitudinal phase conjugate wavepairs, as we discussed and reinterpreted above.

So all EM fields and potentials and waves are just sets of what will be after interaction/

observation pure effects longitudinal EM waves (with hidden, unobservable, accompanying causal time-like longitudinal EM waves) with impressed dynamics. In the West, this is a totally neglected, far more fundamental electrodynamics than the "gross bulk electrodynamics" we utilize. In Russia, the KGB calls the interior longitudinal EM wave electrodynamics the information content of the field. The KGB has highly weaponized this infolded LW electrodynamics for several decades, and for several succeeding generations of weapons.

As an aside, we point out that the mind and its operations are time-like. Hence the engineering of time-like longitudinal causal EM waves allows the direct engineering of mind at all levels, including short term and long term memory, perception, consciousness, the unconscious mind (a massively parallel processor and totally conscious, just multiply so), etc. The overall extended electrodynamics/unified field theory is called energetics. It has three branches, depending upon what is targeted. Against inert mass, normal EM fields and waves and potentials, etc. that branch is called the same name: energetics. Against the living physical body, cells, biopotentials, biochemical functions, etc. that second branch of energetics is called bioenergetics. Against the mind and mind operations, that third branch of energetics is called psychoenergetics. We will not further discuss psychoenergetics in this paper, but will give an example of Russian bioenergetics testing.

Example of Russian Weaponization

As an example, the so-called Russian microwave radiation of personnel in the U.S. Embassy in Moscow created deliberately induced health changes and diseases in U.S. personnel for four decades. All personnel health changes and diseases occurred only in areas that were field-free, hence in areas where the potentials were constant and stable.

That meant that the interactions of the infolded electrodynamics structuring (the engines) in the stable potentials were the culprit. Had the EM radiation not been involved, then some health changes would have occurred in areas of the Embassy where fields were present, and some where they were absent, on a random basis.

As the Prioré team unwittingly showed and the Russian microwave radiation of the U.S. Embassy cleverly concealed, the infolded longitudinal wave electrodynamics is engineerable. Not only can it be made to heal, as in Prioré's application, but it can also be made to sicken and kill, as in the KGB testing against U.S. personnel in the U.S. Embassy in Moscow. Indeed, over the years three U.S. Ambassadors were sickened by the microwave radiation and eventually died.

The Subspace of Infolded EM Inside Conventional EM Entities

Regarding the vacuum potential as identically spacetime, we thus have a sort of "subspace" interior of spacetime—somewhat similar to, but vastly extending, the present concept of dimensions wrapped around a point, as in the Kaluza-Klein theory. The "interior" of EM

fields, waves, and potentials—considered in 4-space—is actually a special kind of electrodynamics, using paired sets of longitudinal EM waves (in both the time domain and what will be in 3-space after interaction) and their dynamics. Note that these internal LWs are identically spacetime curvatures and their dynamics, in organized sets or "templates". So "ordinary" EM waves and fields and potentials can and do carry such engines and templates. Further, potentials superpose and "spread through one another". The internal structures (engines) diffuse one into the other, or "mix" in that case. Emissions from a biological body (as fields and potentials and waves) thus carry thorough internal engines which represent the exact interior conditions and dynamics of the emitting body in all aspects. A future medical diagnosis technology will apply developed longitudinal EM wave technology to directly analyze all major aspects of health interest, for a living body.

The Biophysical Mechanism Utilized Empirically in Homeopathy

We mention in passing that homeopathy has long dealt with the fact that these interior engines and their templates diffuse from the potentials and fields in a dissolved substance, out into the potentials and fields and waves in the liquid. The hydrogen bonding actions particularly provide a special kind of continuous energy density, hence constitute a special potential or "H" potential. Immediately one sees that the interior structure (engine) of the H-potential is structured by diffusion of the engines of the dissolved compound. One can dilute the solution, then by shaking violently the diffusion of engine structures will be spread throughout the entire H-potential of the new solution. When by extreme dilution methods the actual physical compound is no longer physically present, the engine structures of that compound dissolute can still remain in the
H-potential of the final solution. Hence there is a very real physics involved in the homeopathic method, and that physics can be completely described in terms of O(3) electrodynamics. It cannot be described in U(1) EM theory, since it does not recognize the inner structuring of the potential, fields, and waves.

Application in Reverse for Healing

"Curvatures" or changes in spacetime are just changes in and to those internal longitudinal waves (both causal and effect) and their dynamics, inside normal electrodynamic causal entities. Control and engineer the interior electrodynamics (the infolded longitudinal EM waves and their dynamics) of the causal EM waves, fields, and potentials, and one does in fact utilize a novel but highly engineerable unified field theory capable of controlling and changing matter in any fashion. One is free to directly engineer matter as one wishes, from the gluons and quarks in the atomic nuclei, to the molecules, to the physics and the chemistry, and to the DNA and operations of the living cell and living biological system.

Energetics Causes Arise and Act from the Local Spacetime In Which the Target is Embedded

We emphasize that the use of engines does not require or involve the "transmission of overt

EM energy through space" at all. One does not have to have the energetic engines "penetrate" in
3-space from "outside" an object to "inside" it. Instead, the changes propagate through subspace, changing the "inside" of local spacetime itself. Specifically, the causal energy and patterning enter from the time-domain, which is multiply connected to every part of the treated body at every instant. Hence the resulting active engines arise from the local spacetime within the body and within every tiniest part of it.

The energetics of the engines and their interactions arises from within the object, from everywhere in it at once, and acting on everything within it at once. This is not the conventional "acting from outside in", but totally unconventional "acting from inside out".

In several papers we have previously proposed how this "inside-to-out" action is used to generate specific mechanisms for new low energy nuclear reactions involved in "cold fusion" experiments. The approach explains the production of deuterium, the production of alpha particles, the production of tritium, etc. as well as the production of the excess heat. It also explains the years of anomalous instrument effects in electrolyte experiments in U.S. Navy research facilities at China Lake.

An Example: Russian Microwave Radiation of U.S. Embassy Personnel in Moscow

Conventional "outside-in" Faraday EM shielding useful against spatially propagating overt EM energy has no effect at all on "inside-out" propagation, as was shown in the Moscow Embassy radiation incidents after aluminum screens were erected on the Embassy. The EM 3-space microwave field penetration (as continually observed is assumed!) through the screens and into the Embassy was reduced some 90% by the screens. The field-free potentials were unaffected, and they contained all the internal active engines, to embed in local spacetime and "act from inside out". So the health changes and disease inductions continued. Two beams were used in the microwave transmissions, meaning that scalar interferometry (longitudinal EM wave interferometry of the infolded energetics) was utilized as well. This allowed the additional ability to produce ordinary EM radiation emerging in the exposed bodies in the field-free areas, in whatever patterns were desired.

The purpose was to stimulate high-level attention of the U.S. Government, intelligence community, and scientific community to see if they were aware of what was actually being done. By U.S. actions at the Embassy site, whether or not the U.S. understood the engines and antiengines area could be determined with very high confidence.

For quite some years the U.S. showed conclusively that it had no understanding of what was being done, how the diseases and health changes were being introduced, or the mechanism being used.

We point out that the Embassies in Russia of other nations were also subjected to similar

radiations and effects, for the same purpose.

The Prioré Mechanism: Amplified Damage-Specific Antiengines

Now the active Prioré mechanism can finally be understood as specifically generated and 100% correlated amplified antiengines introduced throughout the body down to the deepest levels, including the genes and chromosomes and even the atomic nuclei. The Prioré team demonstrated revolutionary cures of terminal tumors in laboratory animals, and cures of infectious diseases such as trypanosomiasis. They reversed ("cleaned out") clogged arteries, thus reversing atheriosclerosis. They also restored suppressed immune systems.

Some two thousand experiments were conducted on laboratory animals, and quite a few clandestine experiments successfully cured tumors and cancers in human patients. The results of the animal experiments are published in the standard French scientific literature in leading French journals.

This Is the Logical "Next Great Extension" to Mechanical Nanotechnology Templating

So the same template concepts being utilized and developed in nanotechnology today do extend much further that just mechanically into the molecular region. They also extend into the unified field theory region. If not only mechanics and U(1) are employed, but a higher symmetry electrodynamics such as O(3) is employed, nanotechnolgy will dramatically extend into a vast new and direct healing technology, where the actual mechanism utilized by the cellular regenerative system can be highly amplified and used.

An Example: Complete and Ready Cure of AIDS Would Be Possible

The application to diseases such as AIDS is immediately apparent. E.g., given the development of the engine and template technology in unified field theory, electrodynamics (higher symmetry) could be used to directly time-reverse all cells of the body—including all the immune cells—back to a previous healthy state, as soon as the patient tests positive for AIDS. There would be no need to wait for the symptoms and ravages of the disease to appear.

Also, even a patient in the advanced stages of the disease, and with concomitant opportunistic infections, could be quickly and rather inexpensively treated and cured. Note that the DNA of the cells is also time-reversed back to an earlier stage, so the problem of the remaining small residual infected cells with altered genetics that escape drugs, etc.—and progressively adapt and become more resistant—would be totally bypassed.

Rejuvenation of the Aged Is Practicable

Obviously, rejuvenation of the aged also appears to be directly engineerable by such

fundamental methods. Just time-pump the entire body and all its cells and tissues, to gradually time-reverse all the cells of the body. Normal cells just get a little younger and more vigorous. Aged or damaged cells return to normal again as they also get younger.

But as one might suspect, there are very powerful financial interests that do not wish such a thing done at all. As an example, a great deal of money is made today by treating the disabilities of the aged, to alleviate symptoms and not achieve cures at all. Change that lucrative formula, and some very great financial empires—who spend $300 million or so to develop and FDA-certify a single new drug!—are at serious risk.

Simplifying and Extending Prioré's Process

There is also a method of highly simplifying and speeding the Prioré radiation results, discovered in Germany but not theoretically understood by the discoverers. We will have more on that later, in perhaps another paper. In my 1998 presentation to the DoD and other government agencies, I did propose an adaptation of that methodology as something for which the treatment devices could be made very small (suitcase sized) and highly portable and adaptable—and relatively inexpensive once sunk development costs were spent. The view is to develop and mass produce this type of relatively inexpensive and effective mass treatment apparatuses, which could be flooded down through all emergency facilities and organizations (hospitals, fire stations, police stations, National Guard, etc.) and used to treat and save mass casualties in the forthcoming terrorist use of biological weapons and other weapons of mass destruction upon the population centers of the United States and other Western powers.

Briefing and Informal Proposal Sent to DoD and Other Government Agencies

On my website, http://www.cheniere.org, there is a briefing of more than 80 colored slides I submitted to the U.S. Department of Defense and many other U.S. agencies in 1998, urging a crash development program for this method of engines and templates. The plan was to use the special "shortcut" and simplified method, in very small, portable equipment, for use in treating the mass casualties we expect in future terrorist attacks on our population centers with weapons of mass destruction.

For example, in their clandestine biowar laboratories, the Russians modified the smallpox pathogen among other things, so that everyone's vaccination is ineffective against it. Further, there is little smallpox vaccine left these days, even against the former smallpox strain. The U. S. just discovered that its remaining smallpox vaccine cache is in fact contaminated and not fit to be used on humans anyway.

We also know that, after the collapse of the Russian economy, the Russian scientists in those bioweapons labs quietly left Russia and were employed by other nations, many quite hostile to our own nation and to the West in general.

The implications are obvious. The coming weapons of mass destruction strikes on our large population centers are known to be planned, and this threat has been officially recognized as the greatest strategic threat against the U.S. today. Quite frankly the U.S. is still woefully unprepared to handle such strikes, as far as effectively treating and saving the stricken casualties is concerned.

The Major Present Defensive Response Is Triage

Sadly, the preparations for "defense" against these known-to-be-coming mass strikes are still very much inadequate and will massively fail to do the job. Instead, we will see triage on a massive scale.

Triage is "the sorting of and allocation of treatment to patients and especially battle and disaster victims according to a system of priorities designed to maximize the number of survivors." [Webster's Medical Dictionary, 1986.] This is a very blandly worded definition of something blood-curdling: It means "drag to the side all those who will probably die anyway or already have the symptoms advancing, don't treat them, and just let them die so we can try to save a few of the others."

The problem is, modern war has moved from over there amongst the soldiers to over here amongst the civilians—men and women and children and babies, the aged and the infirm, the sick and the well. Strategic terrorist strikes on the United States will occur not confined to some distant battlefield, but right in our cities—particularly in and on our great population centers, which will be struck and struck hard.

According to a study performed by the Congressional Office of Technology Assessment before its dissolution, a single small "Piper Cub" type aircraft with two terrorists (one to fly and one to spray), employing a common agricultural sprayer, and spraying 100 kilograms of anthrax spores while flying around leisurely over Washington D.C. on a calm night, will generate (conservatively) from 1 to 3 million casualties. The attack will also horribly contaminate the entire area with anthrax. The terrorists will be long departed prior to the emergence of the symptoms in the population a few days later.

If the terrorists use a cocktail mix of other pathogens as well, such as smallpox, an absolutely horrifying scenario of mass casualties will ensue on a scale never before heard of in America.

For the uninitiated, in such mass casualties (say, 3 to 10 million sick and dying of smallpox, anthrax, and a cocktail of other diseases, with certainty of spreading by carriers), the present stockage of medical supplies is but a spit in the ocean as to what is really required. Consequently, the precious little stores of antibiotics, vaccines, etc. that are available will be reserved for use on patients deemed to have a reasonably good chance of surviving if treated. Those already ill and most desperately needing treatment, but deemed not to have a good

survival chance, will simply be moved aside, perhaps made comfortable if possible, and deliberately allowed to die without treatment.

The American public still does not realize that (1) most of its mothers, fathers, children, etc. will already be in desperate circumstances once the symptoms from the attack—actually made several days earlier—start emerging en masse, (2) for many or most of the stricken, there is then very little chance of saving them even if treated with available conventional means, (3) the conventional means are so scarce and there are so few treatment teams available that only a pitifully few persons can be treated prior to exhaustion of the supplies and death of the afflicted, and (4) the standard and approved practice for such dire circumstances is already determined: It will mostly be to simply move their loved ones aside and do little or nothing for them, while they painfully die horrible and agonizing deaths.

If the mass news media had its head on straight, and would clearly explain what is going to happen to the American public on the course presently set, I believe there would be a mass swell of protest that would force the government to (1) develop more massive, portable treatment capability, (2) flood that capability down through all the civilian facilities and resources as well as in the military units, and (3) in a national crash program, seek out at utmost speed and test any and innovative new technology that could possibly save that huge percentage of all those coming mass casualties that as of now will assuredly perish. Their perishing is already reluctantly recognized and planned, because of the extremely limited capabilities to treat or save them!

It doesn't take a rocket scientist to see that we need a lot more treatment capability, and we also need a much more effective treatment capability than anything in the inventory, being worked on, or even known to the conventional establishment. Getting a new and effective treatment capability can only be met by going outside the "conventional" thinking on the problem. Indeed, it can only be met by miniaturizing the type of treatment methodology indicated by the revolutionary results of the Prioré team. To the present, the Government agencies have not even one scientist contact me, and discuss the potential great saving of life and how valid the proposed technology development is or is not.

At NIH, e.g., I never got out of their "policy" (read: spin control) section. Not a single scientist from NIH bothered to call me and discuss the potential development, how solid the science was or was not, etc. In short, not a soul took it seriously. Not a soul apparently bothered to read any of the French literature references reporting the Prioré team's revolutionary results. In short, not a soul was interested in solving the problem, if it calls for going out of the "drug 'em, vaccinate 'em, hit them with antibiotics accepted approach. Oh yes, drag them off to die by applying triage is acceptable. But saving them is unacceptable if it is not done by "approved" pharmaceutical methods.

In short, it was business as usual. Oh yes, they have apparently developed harsh sprays that kill the anthrax, on the ground where it lies and also in your body if you breath in the spray.

Well, that is a way to go about decontaminating a city, and it may be quite necessary. It's very harsh, and it will kill some of the sprayed populace, but it will also save lots more people than it kills. It appears appear they've also been practicing quite a bit so as to get the aerial spraying patterns correct.

With the science and treatment that are actually in hand at present, such harsh methods are extremely regrettable but militarily understandable. In combat, one sometimes has to send a division to its death, so to speak, in order to save the rest of the Corps. With war now to be fought right in the civilian populace, these harsh and formerly purely military decisions made on distant battlefields now have to be made right in our cities with civilian lives. One can appreciate the agony of a decision, say, to spray Washington, D.C. with anti-anthrax spray after an anthrax attack, knowing that in doing so the spray itself will kill some 10,000 to 20,000 persons. Yet if the spray is not used, perhaps three million more lives will be lost than if it is used. One sees the point. Such harsh decisions are now necessary and they will have to be made for the civilian populace. Triage is just one more of those harsh decisions. In a 3 million casualty example, triage may well require that two and a half million American citizens be deliberately moved aside and allowed to die.

The heartbreaking point is that there is a better way, if the ponderous government agencies will seize upon it, fund it, and get it developed at all speed with a new Manhattan Project. And if the leading influential scientists in our scientific community will examine the Priore team results, shackle the dogmatists who froth at the mouth at anything new, and spend some of that taxpayers' billions showered on them in a all-out effort to save those taxpayers' lives in return. In view of the seriousness and validity of the threat and those kinds of predicted results, anything less from our scientific community must be called into question as approaching scientific treason against the entire populace of the United States.

How Serious Is the Threat, Really?

To see just how extreme the threat can easily be, we call attention to an excellent article: Laurie Garrett, "The Nightmare of Bioterrorism," Foreign Affairs, 80(1), Jan./Feb. 2001, p. 76-89.] We quote from p. 77:

> "Were a terrorist to disperse the smallpox virus, for example, populations that were once universally vaccinated would now be horribly vulnerable. Today the U.S. government stows only about 15.4 million doses of the smallpox vaccine—enough for less than seven percent of the American population. The World Health Organization (WHO) keeps another 500,000 doses in the Netherlands, and other national stockpiles total about 60 million more doses of varying quality and potency. If the smallpox virus were released today, the majority of the world's population would be defenseless, and given the virus' 30 percent kill rate, nearly two billion people would die."

Well, our stored vaccine will still save us or most of us, right? Wrong. Quoting again from Garrett, ibid., p. 77:

> "…in 1999…scientists discovered that the U.S. samples of the smallpox vaccine had severely deteriorated. Originally made in the 1970s by the Wyeth pharmaceutical company, the samples were stored at the Centers for Disease control and Prevention (CDC) in Atlanta in the form of freeze-dried crystals parceled out in 100-dose quantities inside vacuum-sealed glass tubes. The tubes were further sealed with rubber stoppers secured by metal clamps. To their dismay, CDC investigators discovered condensation in many of the glass tubes, indicating that the rubber stoppers had decayed and vacuum pressure had been lost. Such vaccine supplies can no longer be considered safe for human use."

Well, the shocked reader may exclaim. Can't we get some vaccine that is stored by the other nations of the world, etc.? And won't that save us?

The answer is, no, we can't get it, and even if we did, it would not do any good either. Again quoting Garrett, ibid., p. 77:

> "Although the rest of the world's vaccine reserves have not undergone similar scrutiny, experts do not have much confidence in those either. Furthermore, the world's supplies of bifurcated needles—uniquely designed for scratch-administering the smallpox vaccine on human skin—have been depleted, and companies are no longer interested in manufacturing such specialized devices."

The reader can see the point. One can be assured that some terrorists do have smallpox agent, and some even have the modified smallpox agent developed some years ago by the Russians. Hence Garrett's estimate of nearly two billion people dying if just smallpox alone is unleashed, nearly one third of the population of the earth will eventually die.

This is just one example threat of the many we face. It is safe to say that, if weapons of mass destruction such as biological warfare are unleashed on a substantial scale, over half the population on Earth will die in the holocaust. Any nation specifically targeted by multiple strikes may lose over half its own population in those strikes. That includes the United States as at the top of the terrorists' list.

The Need for Action

So as one can see, we need all the technology using templates and engines that we can get. Nanobots in the emerging nanotechnology—though mechanical—are a first good move in that direction. By all means, their development—and concentration into treatments for these coming mass casualties—should be redoubled. The Prioré-type approach of engineering "spacetime nanobots" and engines directly as longitudinal EM systems in spacetime itself, is the logical extension of the nanotechnology templating approach. Both are needed as rapidly as they can humanly be developed. We need a new Manhattan Project, for the WMD threat today is far more severe that was the approaching nuclear threat in the early 1940s. There the

threat was not yet developed and stockpiled. Now it is both developed and stockpiled—including clandestinely cached right here in the United States itself.

Anyway, I want to thank you for posting the nanotechnology information, and to inform you of where the concept of template really leads. It may be that nanotechnology, as it develops, will start to focus on the energetics of the matter, and eventually include the spacetime curvature engine reactions that can be engineered by novel higher symmetry electrodynamics.

One can only hope and pray that this ponderous motion of the U.S. scientific community will finally cut through the dogma and really look deeply into the problem and the potential solution. Millions of American lives are hanging in the balance, while the scientific community seems to be engaged almost in "business as usual. Never mind innovative but odd new approaches, regardless of their potential payoffs." That's a little nicer "scientific suppression by ignoring" than was used in France in the mid-70s to destroy the Prioré project. But it is suppression notwithstanding.

One is ever mindful of how Max Planck wryly characterized the habitual response of the scientific community to real innovation:

> "An important scientific innovation rarely makes its way by gradually winning over and converting its opponents: it rarely happens that Saul becomes Paul. What does happen is that its opponents gradually die out, and that the growing generation is familiarized with the ideas from the beginning." [Max Planck, in G. Holton, Thematic Origins of Scientific Thought, Harvard University Press, Cambridge, MA, 1973.]

Speaking of vacuum energy, Arthur C. Clarke characterized it best for all innovative science:

> "…don't be surprised if the world again witnesses the four stages of response to any new and revolutionary development: 1. It's crazy! 2. It may be possible -- so what? 3. I said it was a good idea all along. 4. I thought of it first." Arthur C. Clarke, in "Space Drive: A Fantasy That Could Become Reality" NSS ... AD ASTRA, Nov/Dec 1994, p. 38.

We can only hope that the scientific community will eventually respond with greater alacrity and depth. It has already been 40 years since the Prioré team began demonstrating unprecedented and miraculous cures with the proposed technology, even though in primitive form. It has been nearly 30 years since the Prioré program was ruthless suppressed by the new French leftist government that came into power, and by the full weight of the orthodox French scientific establishment.

There are indeed large funds given for medical research by private wealthy patrons. As an example, Bill and Mrs. Gates have repeatedly donated large sums of money to worthy causes, particularly to save lives. Recently their foundation set up $100 million to develop a vaccine for AIDS, which continues to take an enormous toll world wide, and is decimating some poor nations. But the AIDS virus is unstable and changes strains often. Any vaccine developed and

used will likely be effective for only a limited time, because the HIV virus will start rapidly adapting to a resistant strain as soon as the vaccinations begin. A $100 million effort in developing the "small unit" approach to the Priore mechanism in a highly portable treatment device, which treats in about one minute, could produce the unit recommended in the color briefing to DoD that is carried on this website. Not only could that $100 million get a very good treatment and cure (and an inexpensive one) for AIDS, but in the process it would also produce a treatment and curative method and device that could save some 70% or so of those coming millions of helpless American casualties.

Make no mistake, the coming terrorist attacks are not a joke, and neither is triage. Until the scientific community wakes from its lethargy and moves vigorously on this type of unprecedented medical treatment and potential, the dark shadow of triage hangs heavily over every home in America, and in fact over every home in the developed nations of the world, as well as many of the impoverished nations. As of this moment, if one's city is struck here in America, of necessity there is a very good chance one's own government will simply let one die, along with a preponderance of one's loved ones and neighbors.

Millions of Americans are going to die, just as surely as the sun will rise tomorrow. And that is something with which both the governmental community and the scientific community will agree.

Very best wishes, and thanks again for all your efforts.

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